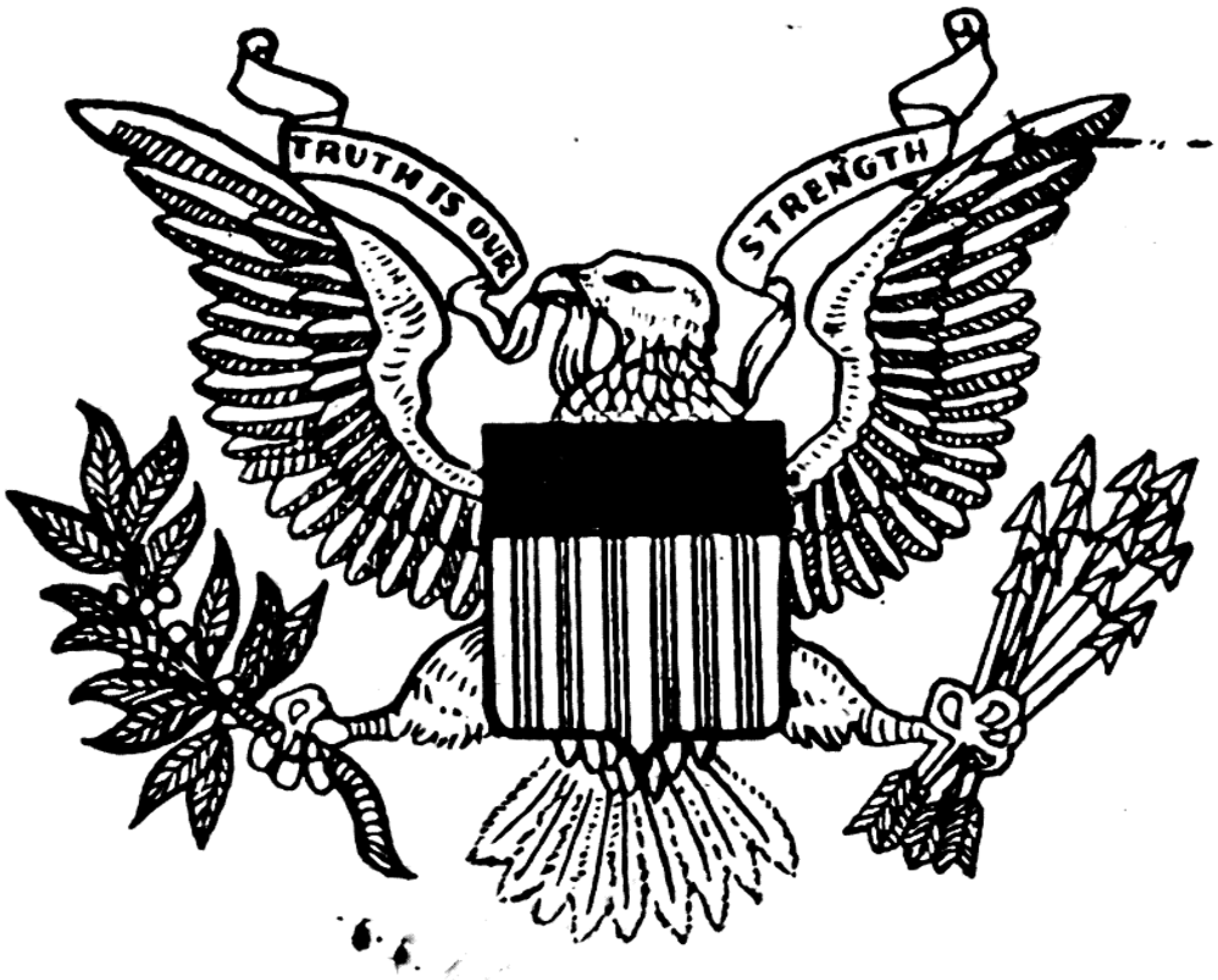
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AUDIO-VISUAL

MATERIALS AND TECHNIQUES

AUDIO-VISUAL MATERIALS AND TECHNIQUES

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E.P. I
AUDIO-VISUAL MATERIALS AND TECHNIQUES
MADE IN THE UNITED STATES OF AMERICA

PREFACE

My belief that audio-visual education has been taken too casually has had much to do with determining the completeness and scope of the present volume. The time has passed when one may use a mere handbook on motion-picture projection and, having learned the mechanics, say, "I am qualified to use audio-visual aids." These newer materials must be used in the right way. The modern school program demands teachers who can vitalize learning, not gadgeteers who only push buttons. A comprehensive understanding of the value and the use of the newer instructional materials must be built on the psychology of learning and the knowledge that true learning rests fundamentally upon direct experiencing. Teachers must be able to think constructively and broadly. Audio-visual materials are a means to an end, the development of the maximum potentialities of every student.

In this volume I have attempted to bring together the best modern theory and practice in the use of the newer and more varied instructional materials. Each is treated functionally and practically. Its utilization is indicated, not for one subject nor one age group, but for all its implications in the learning process. In order that the several learning materials may be better appreciated, a brief historical sketch of each is included. Although referred to as the newer instructional materials, most of them have been tested experimentally in classroom and laboratory by teachers and psychologists for two decades or more.

This volume is arranged in four parts: introduction, visual materials, audio materials, and the organization and administration of an audio-visual program. The audio phase is treated with the same detail that visual material is treated.

In the writing of this book I have kept in mind constantly the needs of readers of three types: (1) students, graduate and undergraduate, in teacher-education institutions who have had no experience in classroom teaching; (2) teachers in service who desire to know more about a rapidly developing field of education; and (3) directors of audio-visual programs

and administrators who have the practical task of organizing an audio-visual program. Although not intended for such specialized educational workers as directors of religious education, youth activities, or industrial training, these leaders will find suggestions and information in the text, which, because of its basic nature, will be of assistance to them also.

I have had unusual opportunities to test many of the materials and concepts described in this book: as teacher in public schools and as instructor of teachers; as supervisor of hundreds of student teachers who have worked in schools large and small; and as director of an audio-visual lending library. Every chapter has been tried out in my classes of pre-service and in-service teachers in state universities, municipal universities, and private colleges. The material of this book is based upon research findings, an analysis of the educational literature, participation in the planning and organization of audio-visual programs for schools, conferences, and workshops.

I owe a debt of gratitude to many people who have assisted me either directly or indirectly in the preparation of this book. I owe most to Mary Lett Kinder whose patience, advice, and assistance have found their way into every chapter. I gratefully acknowledge the assistance received from Franklin Dunham, Chief of Radio, United States Office of Education, and to Dr. Andrew J. Miller, Assistant Director of Curriculum Research in the Pittsburgh Public Schools and Instructor in Radio, University of Pittsburgh. These men have read Part Three in its entirety and have contributed valuable suggestions. Indirectly, I owe much to my colleague, Dr. John A. Hollinger, formerly Director of Audio-Visual Education, Pittsburgh Public Schools, and currently Assistant Director of the Pennsylvania College for Women Film Service. It was Dr. Hollinger who more than anyone else years ago awakened me to the importance of scientific tools in education. To another colleague, Professor Robert Zetler, I acknowledge assistance in the organization of the project. I also wish to express my appreciation to various teachers, directors of audio-visual education, publishers, and commercial companies, who have co-operated in providing illustrative material for the book. Finally, my deep thanks go to my former students who have consciously or unconsciously helped mold the ideas of this book. Whether flattering or severely critical, their reactions are reflected within these pages.

JAMES S. KINDER

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APPENDIX

AUDIO-VISUAL

MATERIALS AND TECHNIQUES

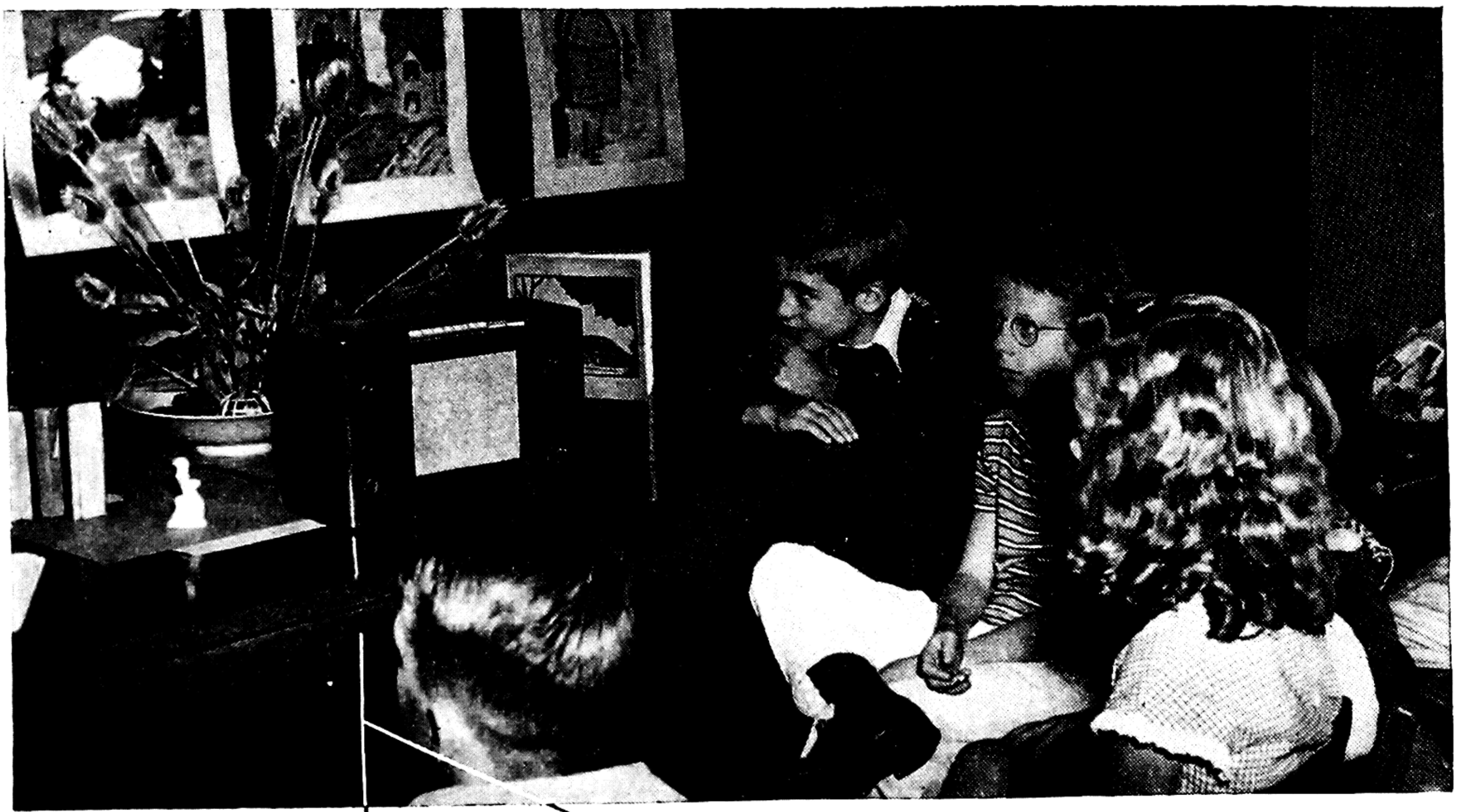
Part ONE



AN INTRODUCTION TO AUDIO-VISUAL MATERIALS AND TECHNIQUES

To facilitate and clarify the organization of this book, groupings of chapters have been made, embracing four sections. This section is called an Introduction because it presents essential background material, philosophy, theory, and the status of audio-visual education today. It will serve as a review for graduate students and as an orientation for students who are studying the subject for the first time. The chapters in Part One are:

1. A PHILOSOPHICAL FRAMEWORK
2. AUDIO-VISUAL EDUCATION TODAY
3. THE TRANSMISSION OF IDEAS—A PANORAMA
4. THE ROLE OF THE TEACHER IN PERCEPTUAL LEARNING



Chapter 1

A PHILOSOPHICAL FRAMEWORK

The origin of instructional practices goes back into a dim past. In primitive societies the knowledge necessary for existence was acquired through trial and error and imitation. There were no special instructional materials or techniques. It was not until written records appeared that specialized instructional methods were developed. Through the ages each generation has added something to the body of instructional practices, believing, in each case, that improvements had been made. As discoveries, developments, and new understandings came about to meet the problems of life, they were incorporated into the educational framework. Through the years, systems of methodologies have grown large and their applications are often cumbersome and lacking in functionality. Instructional materials, too, have increased in number.

This book deals with audio-visual education; accordingly, it is chiefly about materials and the methods employed in using them. Scientific

developments have increased educational materials, and tools and equipment are not so limited as they formerly were. Until recently educators' tools were pretty generally restricted to textbooks and supplementary reading materials, but newer materials have, beyond all doubt, enhanced the educational process and learning itself.

Since this is a book about audio-visual education, there should be an understanding of general terms at the outset. Earlier books used the term *visual education*. The term is still widely used and is in good repute, except that it is sometimes misleading. Unless care is exercised, some people, both beginners and experienced educators, may get the idea that the eye (visual) is the sole avenue to education. It is recognized by psychologists and educators everywhere that a large amount of learning comes through the sense of sight, but the other sense organs must be given due emphasis, too, for they play an important role in learning. Secondly, *visual education* may lead some to conceive of a new type of education co-ordinate with primary education or secondary education, or again it may be conceived of as a new subject to be taught as such. Another objection to the term *visual education* lies in the fact that when used alone, people have been inclined to think of motion pictures; yet the term was meant to include all pictures, graphs, cartoons, maps, globes, specimens, and objects—in fact, all perceptual materials.

Some writers use the term *visual-sensory* when speaking of educational materials other than those of the written or verbalistic type. Sensory pertains to sense perception as distinguished from intellectual perception, and means the faculty of receiving mental impressions through the sense organs of the body. Man contacts his environment in the main through the five major senses—touch, sight, hearing, smell, and taste. In the classroom the first three of these senses are the chief avenues of learning.

Although the term *visual-sensory* is satisfactory, another term, *audio-visual,* has superseded it in most of the literature and in most conferences and discussions. Audio-visual emphasizes the two most important of the sensory learning avenues; and with the importance which is given today to motion pictures, slides, filmslides, recordings, and radio programs, there is ample justification for acceptance of this terminology.

Several attempts have been made to popularize the term *perceptual learning* or *perceptual aids to learning*. One writer says "what we are seeking is not *visual education* but *perceptual learning*." These terms have never been widely used.

The phrase *audio-visual aid* is frequently used. Some educators object to this phrase because to them the word *aid* suggests that films, records, slides, graphs, and other such media are crutches which merely support other types of learning. Such an unfair limitation implies that they have no value in their own right. From this standpoint the phrase is unacceptable; but to those who consider *aid* as a means of transference of thought and experience, the term *audio-visual aids* is as acceptable as any other.

A much more defensible term is *material.* This word ties in with the curriculum and gives these new media co-ordinate standing with such other learning materials as books, pamphlets, newspapers, and the like. Thus, such things as films, transcriptions or models become primary learning materials or the means of communicating ideas. In many instances they are even better than the printed or spoken word.

Throughout this volume, all of the above terms will be used, and somewhat interchangeably, yet our final term is *audio-visual materials.* And to repeat for emphasis, audio-visual education is not a new subject to be introduced into the curriculum; in fact, it is not a subject at all. Nor do visual and sensory materials and techniques replace other proved teaching devices. These new devices, however, are important in extending the school's curriculum materials and in enriching instruction. Their appeal is varied, and their simple concreteness will be beneficial to every child,



Child artists conduct their own sidewalk exhibit in a congested city district.

WIDE WORLD

regardless of his mental capacity. There is a place for audio-visual materials and techniques in every school curriculum.

Each curriculum material has its own unique contribution to make to the pupil's educational development. In some instances a certain material is basic; in others it is supplementary. The film may be supplementary in the study of electrons, yet in the Norman invasion it is primary. *Othello* may be studied from the stage performance, the book, the film, or the record. Next to the stage, the film is probably the best single primary source. For a first impression from which understanding and enjoyment may grow, probably the book comes last in importance, because Shakespeare wrote his plays to be acted and seen by people, not to be read. A basic understanding of children of other lands cannot possibly be garnered from the printed page or the spoken word. One has to see these children of other lands, talk with them, play with them; but lacking this, the sound motion-picture film is incomparable.

Many audio-visual materials are old and have had a place in school rooms and instructional techniques for scores of years; some were used in man's earliest efforts at instruction. Others, such as television, are so new as to be found in only a small percentage of schools.

Specifically, what are these materials? The following outline classifies those usually included in the field of audio-visual education:

I. REPETITIVE MATERIALS
- A. Blackboards
- B. Bulletin boards
- C. Duplicating devices

II. PICTORIAL AND GRAPHICAL REPRESENTATIONS
- A. Photographs
- B. Textbook illustrations
- C. Prints and etchings
- D. Cutouts
- E. Post cards
- F. Newspaper clippings
- G. Drawings and sketches
- H. Charts, graphs, and tables
- I. Cartoons
- J. Pictorial statistics
- K. Posters
- L. Maps and globes
- M. Diagrams and schematics

III. STILL PROJECTED PICTURES
   A. Stereographs (unprojected)
   B. Lantern slides
   C. Filmstrips
   D. Opaque projections
   E. Positive transparencies
   F. Micro-slide projections
   G. Tachistoscopes

IV. PROJECTED MOTION PICTURES
   A. Silent motion pictures
   B. Sound-on-film motion pictures

V. AUDITORY MATERIALS
   A. Phonograph records
   B. Electrical transcriptions
   C. Radio broadcasts
      1. Amplitude modulation
      2. Frequency modulation
   D. Centralized sound systems

VI. AUDIO-VISUAL AIDS IN COMBINATION
   A. Sound motion pictures
   B. Television
   C. Sound filmstrips

VII. THE SCHOOL JOURNEY

VIII. THE MUSEUM

IX. REPRESENTATIONS AND RELIEF DISPLAYS
   A. Models
   B. Objects
   C. Specimens, collections, samples
   D. Relics
   E. Dioramas
   F. Sand tables, miniature sets, floor representations
   G. Mock-ups
   H. Miniatures, dolls, etc.

X. DRAMATIZATIONS

XI. DEMONSTRATIONS

XII. MISCELLANEOUS
   A. Flash cards
   B. Albums
   C. Illustrated booklets, scrap books

The task before the schools today is so broad in scope and so complicated in character that education must utilize every tested and approved method known. Only in this way can the schools hope to equip each child with habits, skills, concepts, attitudes, and critical thought processes. This does not mean merely a teaching "for life"; it means "living" during the process. In other words, the school is not only providing for enriched and efficient later years of life; it is giving satisfaction in living today as well.

Man neither learns nor lives in a vacuum. A present-day criticism of the educational organizations of the past is that the school did seem to exist in a vacuum apart from the bustle of society. Its curriculum had seemingly been sterilized. Reality was lacking. Dynamics did not exist. Students were taught to accept the spoken or written word without question. Such a philosophy of education resulted too often in narrowness of outlook, in an inability to think constructively and broadly, in prejudice, in superstition, or in similar behavior patterns.

A different philosophy of education is now emerging. The purpose of teaching is basically to arouse the pupil and to direct his behavior into channels which are desirable, such as the development of proper skills, useful habits, conceptual understandings, acceptable attitudes, personal appreciations, and critical-mindedness.

Difficult subjects can often be brought into the realm of comprehension by a teaching aid.

COURTESY OF ATLANTA PUBLIC SCHOOLS



The philosophy of audio-visual education accepts this tenet and holds that audio-visual materials validate this principle. Beginning with the child as the central figure in the school, audio-visual education emphasizes that the learning process is accelerated when the child is placed in a situation which facilitates learning. The classroom, the materials and tools of learning, and the teacher add to or subtract from the meanings acquired by the student. Audio-visual materials, reading materials, discussions, and other tools of learning exist for one purpose only—effective learning. They are means to an end, that end being the transmission, creation, interpretation, and evaluation of experience. Although only partly understood at present, motivation is a powerful force in the learning process. Since audio-visual materials motivate, they cannot be overlooked in any scheme of modern education.

When motivated, pupils engage in exploratory and completing activities; and as they explore, as their curiosity causes them to probe, to be led out (*educare*), they become educated. Naturally, some activities and some materials have more educational significance than others. It is then the business of the teacher not only to direct and guide the learning activities but to give priority to those of greatest worth.

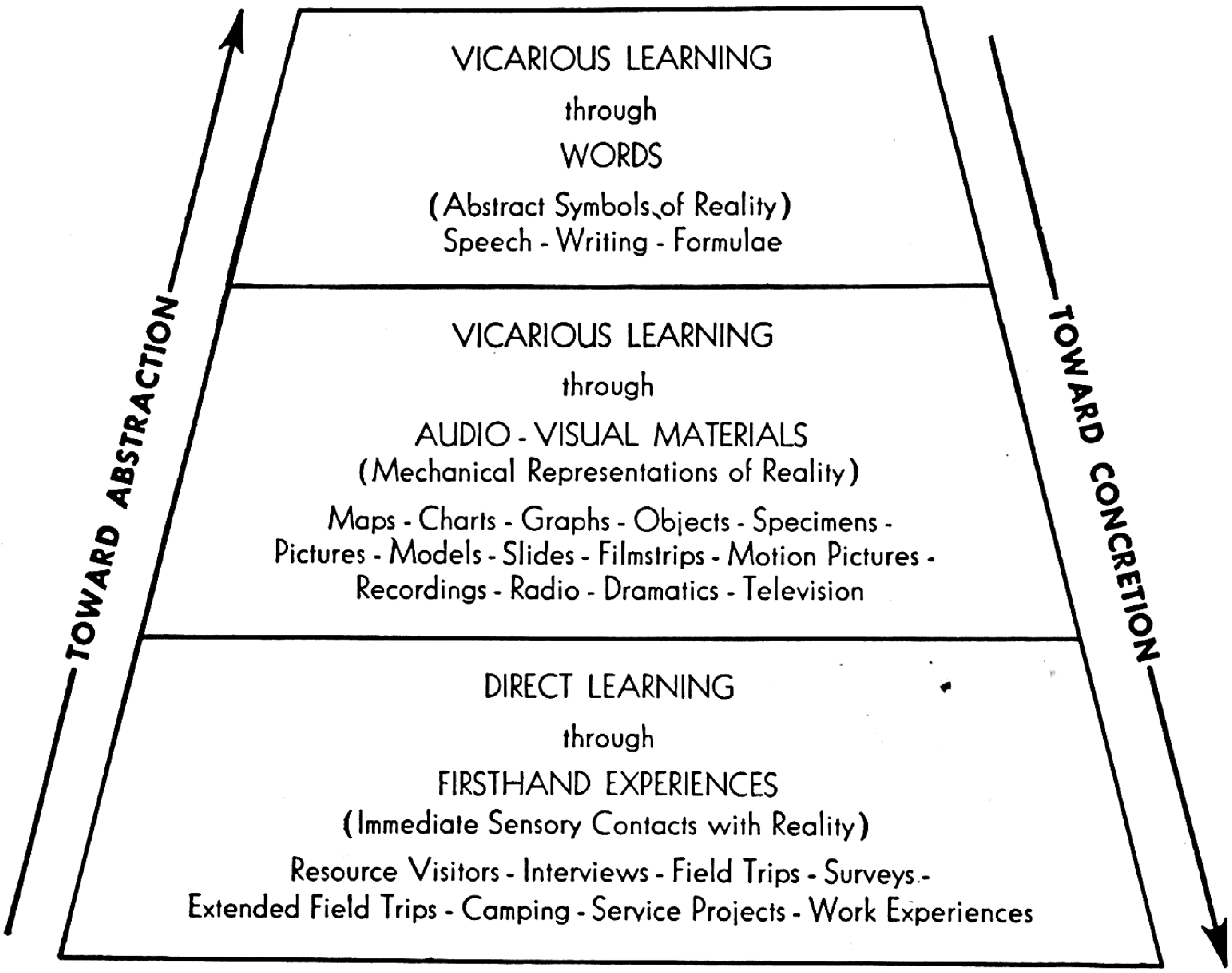
The foundation of true education is to be found in direct experiencing. This type of education precedes history and has come down through the ages as the very bedrock of all knowledge. Just as a magnificent building cannot stand without a solid foundation, no education worthy of the name can exist without direct experiencing at its base. In those areas of the world where the reading school does not exist, direct experiencing, plus some vicarious experiencing, not only supports the educational structure, but is practically the entire framework.

In modern society there are many things which every competent citizen needs to know which he cannot experience directly. Some of these "experiences" are too remote, some no longer exist concretely, some are too costly, and some are of questionable value for all the people. Consequently, rigged or vicarious experiencing, the second level in the pyramid, becomes a necessity.

The top level of the pyramid is symbolized experiencing—verbal and mathematical. The reading school is built on the printed word which is a symbol for an experience, and often a complicated one at that.

Instruction began orally and by direct experiencing. The first schooling was that given by the tutor; for the poor the tutor was the parent, for the

rich it was priest, slave, or professional scholar. It is a beautiful picture, that of a schoolmaster of ancient Greece or Arabia sitting on the ground under an olive tree instructing his pupil. Wisdom came from the lips of the tutor; but the poor, at least, learned chiefly from experiencing. They learned what they needed to know—how to make clothing and build shelters, how to grow and prepare food, how to shape weapons and tools.



E. G. Olsen, "Perspective in Audio-Visual Education," *Educational Screen,* March, 1946.

Learning can be reduced to three basic types—direct experiencing, vicarious experiencing, and symbolized experiencing. These types are analogous to three layers of a pyramid.

When books became common, wisdom and learning were summed up in the books by the use of abstract symbols. Even the things which had been experienced directly by all people were put into books in verbal and mathematical symbols. People seemed to get farther and farther away from direct contact with the things of learning. Many felt that only book learning was of any value whatsoever.

Audio-visual education recognizes values in all these types of learning,

and advocates a synthesis of them. It points up the importance of the specimen as undeniably a learning tool of prime value, and of the field trip as firsthand experience. Such aids may thus be the means for direct experiencing with primary source materials. In some cases learning-substitutes will have to take the place of direct experiencing, and audio-visual aids are among the most effective media for furnishing vicarious experience. This does not mean to say that visual and verbal symbols as represented in quantitative and linguistic abstractions are not a necessary part of the educational scheme. No sane person advocates replacing books or teachers with audio-visual materials. These materials are, in the main, supplementary; they simply make books and teachers more effective. In some cases, however, audio-visual aids may be the primary learning materials. Personal experience that is untested or uninterpreted without words or other symbols is sensation or at best mere perception. Symbols without appropriate experiential contact are nothing more than verbalism.

The proper utilization of audio-visual materials requires skill. Perhaps, by their very nature, they require greater skill than some other methods and materials. The purpose of this volume is to show the values and functions of audio-visual materials: what they are, where they may be obtained, how to make some of them, and their intelligent utilization.

Throughout this volume an attempt will be made to show that audio-visual materials provide clearer goals, enable students to learn more richly and fully, provide for greater appreciation, and foster co-operation between teacher and students and among students.



Chapter 2

AUDIO–VISUAL EDUCATION TODAY

For years teachers have recognized the value of audio-visual aids, and at least some teachers have utilized the available materials. In general, these materials have been of the simpler types, and their use has been neither systematic nor planned. During the last quarter of a century a swelling interest has been discernible in the utilization of scientific materials for learning, but it was not until World War II that the ground swells became tidal in proportion. Edison showed his motion-picture machine to the public in 1894. Research indicated many of its educational values as early as 1917; but it is only now, in the middle of the century, that teachers and educators are fully aware of its importance. Phonograph records remained in recreational limbo for an equally long period.

As this new interest in audio-visual instruction grows with each new development, there is also a noticeable interest in re-examining many discarded materials, and re-evaluating their worth. Such materials as the

slide, globe, blackboard and bulletin board have literally experienced a renaissance.

GROWTH AND DEVELOPMENT OF THE MOVEMENT

It is not possible to give a date at which the audio-visual movement had its inception. The modern interest in the movement seems to have had its beginning about 1920. In that year the National Academy of Visual Instruction was established and held its first national convention at the University of Wisconsin. Three years later this organization merged with the Department of Visual Instruction of the National Education Association. The Visual Instruction Association of America was organized in New York City in 1922, and was affiliated with the Department of Visual Instruction of the National Education Association in 1932. This merger brought together the Eastern and Western wings of the movement. The Department of Visual Instruction of the National Education Association, formed in 1923, has continued down to the present time, although the name was changed in 1947 to the Department of Audio-Visual Instruction.

Research in visual education made lusty strides in the twenties. Joseph J. Weber submitted a thesis to Columbia University in 1921 entitled *Comparative Effectiveness of Some Visual Aids in Seventh Grade Instruction.* After studying the effectiveness of various methods of visual education, F. Dean McClusky submitted his findings as a doctoral thesis in 1922 at the University of Chicago. Frank N. Freeman published the results of several University of Chicago researches in 1924 in a volume entitled *Visual Education.* In 1927 William H. Johnson wrote *Fundamentals in Visual Instruction.* From this volume one ascertains that much work of major or minor importance was being carried on. Johnson's book contains a bibliography of five pages.

In February, 1926, George Eastman reported that the Eastman Kodak Company had conducted extensive studies and surveys of the use of films as teaching aids. At the same time a practical investigation of the use of teaching films in science and geography was undertaken by Ben D. Wood of Columbia University and Frank N. Freeman of the University of Chicago. This investigation was subsidized by the Eastman Company, and was published in 1929 under the title of *Motion Pictures in the Classroom.* In the same year the Erpi Corporation began producing sound motion pictures for the classroom.

Since 1930 researches into the various aspects of visual education have multiplied rapidly. Several scores of doctoral theses have been written, and those prepared for the master's degree total in the hundreds. Pamphlets, textbooks, yearbooks of professional societies, and articles have been appearing in ever-increasing numbers. The first educational journal to be devoted exclusively to audio-visual education in all its phases was *The Educational Screen* which was begun in 1922. Instead of one journal in this field today, there are an even half dozen.

Various organizations have in one way or another lent their influence to the gathering momentum in audio-visual education. Valuable pioneer work was done from 1929 to 1933 through funds made available to the National Committee for the Study of Social Values in Motion Pictures by the Payne Fund of New York City. The dozen studies which grew out of the Payne grant demonstrated conclusively the effect of motion pictures on students' information, attitudes, and conduct. In 1937 the American Council on Education appointed a Committee on Motion Pictures in Education and added to its staff a specialist with the title of Associate in Motion Picture Education. This committee and the staff specialist have been active in the preparation of pamphlets, brochures, digests, and directories. The United States Office of Education has also been active in compiling and disseminating information relative to the use of motion pictures and radio as educational techniques. In 1945 the National Education Association added a visual education specialist to its staff.

DEVELOPMENT AS RELATED TO TEACHER PREPARATION

Preparation in audio-visual materials and techniques has been made mandatory in Pennsylvania for the permanent teacher's certificate. On October 10, 1934, the Pennsylvania State Council of Education passed the following resolution:

> Resolved that all applicants for permanent teaching certificates on and after September 1, 1935, shall be required to present evidence of having completed an approved course in visual and sensory techniques.

New Jersey has made it a requirement in the four-year teachers' college course. In 1945 the California State Board of Education adopted a regulation requiring all teacher-education institutions to provide a two-unit course, or its equivalent, for students preparing to teach. The law became

effective April 30, 1948. And, although not a statutory requirement, such states as Florida, Virginia, Oklahoma, Texas, and Arkansas have regulations which have practically the force of law.

As yet no state has laid down any requirements for in-service teachers, but many teachers are taking courses in summer school and in evening classes. Some of the larger cities require such work. More and more cities are setting up training courses for Saturdays, late afternoons, or evenings. Much attention is devoted to this aspect of teaching in teachers' institutes and conventions. The American Council on Education, in co-operation with state departments of education, universities, and other agencies has held a number of conferences on visual education.

Although there have been no compulsory state requirements concerning in-service training of teachers, half of the states publish and distribute general bulletins, listings of materials, reviews, and catalogs of materials available from the state department and associated agencies. Eighteen departments include audio-visual listings in state courses of study.

As early as 1922 a few scattered courses were offered to prepare teachers to use these new media of education more effectively. Today, courses are offered in nearly every college and university in the country.

Specific teacher preparation for use of the radio is quite as extensive and perhaps greater than visual preparation. Universities and colleges quite generally offer radio courses for teachers both in regular and in summer terms.



A teacher confers with a radio consultant on the use of radio in the elementary classroom.

WIDE WORLD

Practices among teacher education institutions offering audio-visual education courses show little standardization. Many of the institutions are lacking in variety and adequacy of equipment, and others have inadequately trained staffs. Course content varies so widely that one wonders what a standard course should offer. The situation is so chaotic that the conclusion must be drawn that the courses are neither systematic nor adequate.[1]

DEVELOPMENT OF MATERIALS AND THEIR ADMINISTRATION

Another index of the growth and development of audio-visual education is found in the increasing supply of materials and the organization developed to promote their utilization.

National Contributions. Governmental agencies have produced thousands of films. From the standpoint of education, those produced by the Department of Agriculture, the Office of Education, and the Public Health Service are of greatest import. The Department of Agriculture started production in 1911 and has continued uninterruptedly to the present. Its productions of films, slides, and filmstrips have had significant bearing on the development of the field.

The United States Office of Education has produced more than five hundred industrial training films and filmstrips since the beginning of World War II. Although many of these films have only limited use in the classroom, others are exceedingly valuable in teaching commercial subjects, child care, machine shop, woodworking, tool repair, agriculture, and allied subjects.

During World War II the Federal Government entered the 16-mm. film business on a large scale. The Office of War Information released for home-front consumption some one hundred and fifty films (more than 50,000 prints). A somewhat smaller number of films was sponsored by the Office of the Co-ordinator of Inter-American Affairs—films dealing with Central and South America and designed to acquaint us better with our neighbors "South of the Border." Furthermore, the Co-ordinator sent to Latin America more than three hundred film titles dealing with the

[1]To try to bolster the professional courses in audio-visual instruction, the American Council on Education has published a very helpful pamphlet entitled *Foundations for Teacher Education in Audio-Visual Instruction,* June, 1947.

United States. Bond selling reached out for new techniques in influencing people, consequently the United States Treasury Department utilized from five to twelve new and distinct films for each Bond Drive. In the Sixth War Loan Drive the eight film subjects reached an audience of twenty-three million people.

A logical manifestation of the interest of the United States Office of Education in audio-visual education is seen in the fact that it has developed specialized sections in both radio and visual aids. The Radio Section serves as a clearing-house for news of developments involving use, production, and evaluation of educationally useful radio broadcasts and recordings. The Section issues a journal and informational booklets, and maintains personal contacts with educational leaders in the field.

The Visual Education Section performs a similar service. It prints and distributes catalogs of government films, provides information regarding the location of films, furnishes guidance concerning teacher education courses, gives suggestions on problems of administration, and the like. It also handles inquiries from foreign governments about educational films and other visual materials. Its staff members have been much in demand in an advisory and consultative capacity at audio-visual conferences, teachers' meetings, and study groups sponsored by educational institutions and professional organizations throughout the country. Finally, the chief of the staff participates in international conferences dealing with (1) the international exchange of educational films and audio-visual material on a duty-free basis, and (2) the role of educational visual materials in the development of international understanding.

State Contributions. State leadership in advancing the use of audio-visual materials and techniques in the schools has not been lacking. Reference has already been made to the teacher education requirements set up by various states. Substantial financial support has been given by many states towards the purchase of equipment and materials. Among such states, credit should go to Virginia, Texas, Oklahoma, Arkansas, Georgia, Florida, and Connecticut. Thirteen states have an audio-visual section or division in the state department of education. New York pioneered in this respect by establishing a division in 1904.

Possibly the most far-reaching step is found in Virginia, where the state appropriated $1,112,000 for visual education (available July 1, 1945) in the public schools of the state. Disturbed by the low standing of

Virginia educationally, in terms of ability to pay, the governor and the legislature, after two extensive studies had been made, formulated a 10-year program of increased financial support for schools. In addition to the appropriation for visual materials, $4,000,000 were given for increased teachers' salaries during 1946. Virginia intends to equip every schoolhouse in the state with a projector just as soon as practicable. In addition to projectors, films, maps, slides, and other visual materials will be purchased. Teacher-training institutions are embarking on a series of new courses and the staff of the State Department of Education has been augmented.

The Texas appropriation amounted to $250,000, and Arkansas, Georgia, and Oklahoma authorized $40,000, $30,000 and $125,000 respectively.

Ohio and Montana have set up extensive state exchanges and libraries for the distribution of a-v materials to schools throughout the state. State universities and state colleges have quite generally provided audio-visual libraries for the distribution of materials to the schools of the state at a library maintenance cost.

State owned, controlled, and operated radio stations for educational purposes are to be found in many states.

City Contributions. Still another index of the growth of visual education is to be found in the fact that some four hundred school districts in the United States employ directors of visualization. These include nearly every large city in the country. A fourth of these directors devote their entire time to audio-visual duties. In many cases the administration of the visualization program necessitates the use not only of a full-time director but also a staff of considerable size.

It is not possible to estimate the amount of investments which school districts have made in a-v materials. It is worth while to examine the inventories of a few cities taken somewhat at random. Pittsburgh, Chicago, and Los Angeles will serve to good purpose, although a number of other cities will show about the same relative quantity of materials when considered on a population ratio basis.

PITTSBURGH	
Sound Projectors	128
Silent Projectors	98
Lantern Slide Projectors	260
Sound Films (subjects)	694

CHICAGO	
Sound Projectors (used regularly)	500
Silent Projectors (used less and less)	400

PITTSBURGH

Silent Films (subjects)	377
Silent Films Deposited in School Libraries	5,108
Lantern Slides	43,000

Note: All high schools have one or more sound projectors, all have silent projectors and lantern slide projectors. About 90 per cent of the elementary schools have sound projectors, and all have one or more silent projectors and two or more lantern slide projectors.

Approximate Enrollment	69,928
Number of Schools	124

CHICAGO

Stereopticons (mostly unused)	1,000
Filmstrip Projectors (used increasingly)	200
Portable Screens	1,000
Sound Films (used regularly)	9,000
Silent Films (used less and less)	3,000
Stereopticon Slides (Sets) (gradually discarding)	2,000
Filmstrips (constantly adding)	?

Note: Only projected visual aids are handled through the Bureau of Visual Education. Charts, maps, globes, flat pictures, etc., are purchased for and kept in the various schools.

Approximate enrollment	400,000
Number of Schools	400

The Los Angeles public schools are among the most visual-minded in the entire country. The Los Angeles Director of Audio-Visual Education reports that his department occupies 30,000 square feet of floor space and is divided into fourteen sub-departments. The organization for Los Angeles follows:

DEPARTMENTAL ORGANIZATION

1. Administrative
2. Art
3. Assembly
4. Circulation and Distribution
5. Inspection
6. Catalog
7. Co-ordination and Research
8. Film Booking
9. Film Editing
10. Film Shipping and Inspection
11. Nature Study
12. Photography

13. Film and Sound Technical Service
14. Transcription and Radio[2]

A further idea of the strides being made in the Los Angeles schools in audio-visual education is to be seen in the fact that a budget of $140,000 for the year 1944–1945 has now increased to $424,000. Staff members have increased from 38 to 80.[3]

Rural Contributions. Unfortunately the rural contribution to the growth and development of the audio-visual movement has not been great. This is not surprising, since the rural schools are customarily poorly financed in most states. Of course, some rural schools have programs adequate to their needs, but these are exceptions. More and more rural teachers understand the value of a-v materials each year, and even with limited funds manage to enrich the learning experiences of their students. Ingenuity and effort do the job. Many states are trying to overcome the unequal educational opportunities which exist between urban and rural districts by providing equated state school subsidies. It is not amiss to say that no group of children needs the benefits of an a-v program more than the rural children because of the restricted educational environment in which they live.

Contributions from Other Countries. Audio-visual-sensory education is not limited to the United States. There is much random talk to the effect that several foreign countries are far ahead of us in this field, but most of this information comes from sketchy news items and reports following brief excursions abroad. Before the war, Germany undoubtedly was using audio-visual materials extensively both in schools and for government propaganda. Recently the British government released a pamphlet made up from captured records concerning German visual education. The report says that on January 1, 1944, all schools in Germany which were provided with electricity were equipped with projection apparatus. There were 45,346 film projectors (approximately two projectors for every three schools), and 592,000 copies of 16-mm. film were available.

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[2]Findlay, Bruce A., "How High Is Your 'Eye Q'?" *Audio-Visual Guide,* 11: 11–14, November, 1944.

[3]Anyone interested in a more detailed account of the progress which is being made to equip the schools should read: "Audio-Visual Progress Report," *See and Hear,* 4: 11–15, May–June, 1949; "50,000 Projectors, 1-Million School Films," *Film News,* 10: 21, September, 1949.

In many respects the war forced Britain to move ahead rapidly. There is no very good estimate as to the number of 16-mm. projectors in England today, but the number must be large, because the government has been subsidizing audio-visual education. The British Ministry of Education has brought hundreds of its educational motion pictures to the United States and they have found a place in our schools alongside similar films produced here. Much valuable research is going on in England. Paul Rotha's development of the documentary film is universally known.

Progress in Canada during the war years parallels progress in the United States. The Canadian government co-ordinated and stimulated audio-visual instruction. The National Film Board of Canada and the British Ministry of Information were the counterparts of the Office of War Information of the United States. Canada has achieved eminence in production, and has pioneered in techniques for reaching isolated audiences in rural areas.

Many European governments driven into exile during World War II made no progress. But most of these governments, with funds indescribably low, attempted to tell their national stories in motion pictures. Many of these films are still scattered throughout the American schools. It is easy to imagine that these governments will continue to place great reliance on the visual medium in their respective countries just as soon as the more pressing physical wants of the people are satisfied. It is known that Italy, the Netherlands, France, and Russia have already outlined their plans.

Educational development in the Orient is spectacular in its dismally low status. India has recently evolved a plan for making extensive use of audio-visual aids just as soon as projectors and films are available from America and Europe in addition to those produced in India. Of India's 400 million people, only 14 per cent are literate and 90 per cent live in rural areas or small villages. The film branch of the Indian Government's Information and Broadcasting Department is planning adult education programs along with the help to be given schools and colleges. The high illiteracy rate makes the use of books and newspapers impractical. More than three hundred dialects in current use make the radio a poor medium, also. Therefore, a large part of India's motion picture output will be educational. Films and projectors will be purchased by the various provincial governments and distributed and utilized throughout their territories.

EXPECTED DEVELOPMENTS

Serious students of education are inclined to view the future optimistically. Many of the rough places in the development of audio-visual aids are being smoothed out. The movement showed vigorous growth even during the years of economic depression and war. Teacher-education courses are becoming more numerous, and in-service teachers are becoming interested and are being provided with opportunities to learn. State departments of education and state institutions of higher learning are establishing depositories for the easy distribution of materials. These appreciably aid the smaller districts. Valuable research is being conducted in increasing amount. Better technological equipment at cheaper prices is a reality. Texts and courses of study are placing these newer aids alongside other materials. There is a quickening of public interest. Industry and the Armed Services made an unprecedented use of these aids during the war. The developments of the last five years have gone so far that few thinking people question their value. Within the next five years the use of these materials will be multiplied many times.

One of the more specific possibilities for the future is an increased use of the simpler yet somewhat neglected visual-sensory aids such as speci-



At a laboratory school of the University of Chicago, monitors listen at the tape recorder to second-grade class sessions.

WIDE WORLD

mens, models, flat pictures, blackboards, textbook illustrations, photographs, stereographs, and ordinary camera prints. There is a noticeable tendency for children to make many of these materials in connection with their classroom study. Unfortunately much of the literature of visualization omits many of these materials.

Although audio-visual materials and techniques have value for students from kindergarten to university, much of the preceding discussion has been aimed at the elementary and secondary school. The use of visual aids in college classes is growing rapidly and is most pronounced in the natural sciences and the social studies. In the future an important use will undoubtedly be in adult education. The motion picture is unquestionably one of the most effective media for wide dissemination of knowledge for adults.[4] A new organization, the Film Council of America, is designed to use audio-visual communication in community study.

Students who are studying visual-sensory education for the first time may get the idea that progress has been rapid and uneventful. The growth has in reality been continuous but somewhat slow. Only now has sufficient groundwork been laid and decks cleared for the influence which the movement should exert.

A report has just been completed of a survey of one hundred schools whose enrollments lie in the three ranges of 400–600, 5,000–7,000 and 25,000–35,000. The study was carefully controlled, and it developed the bilateral questions of current and future utilization of audio-visual materials. Utilization of eight types of audio-visual materials was studied with elaborate techniques. In the end the author developed utilization ratios which cannot be explained at this time, but it is significant to note the 1957 anticipated use over the 1947 use. The eight materials and anticipated increased use are: classroom motion pictures, 5 times; 2″ x 2″ slides, 10 times; 3¼″ x 4″ slides, 5 times; opaque projection, 6⅔ times; radio and public address systems, 10 times; recordings and transcriptions, 2½ times; museum material, 8 times; and field trips, 5 times.[5]

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[4] Kinder, James S., "Motion Pictures and Adult Education," *The Educational Screen*, 24: 56–70, February, 1945.

[5] Tabler, C. H., "The Next Decade of Audio-Visual Use in One Hundred School Systems," *See and Hear*, 3: 17–20, December, 1947.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Consult the Payne Foundation Studies. Note the titles of the various studies. Read the summary. What bearing did these studies have on audio-visual education?
2. Prepare a catalog study of the courses in audio-visual materials and techniques offered by a selected group of colleges and universities. Are the offerings adequate? Does the importance of the field justify an amplification and extension of the courses as now offered?
3. Consult the last two *Annual Reports of the Federal Security Agency*, U. S. Office of Education, and report on the activity of this government agency.
4. How many cities in your state have a well-organized a-v program? How many of them provide for a full-time director?
5. Visit the county superintendent of schools of your county. Get the facts concerning the use of a-v materials in the rural schools.
6. In spite of the interest in audio-visual education, why are courses needed? Is it possible for teachers to make thorough use of these materials without special instruction? If separate courses are given, what should they stress?
7. List the educational organizations which have devoted a yearbook or some other publication to the subject of audio-visual education since 1940.
8. To what extent is visual education being used in churches and religious instruction?
9. Report on the uses made of audio-visual education by industry and the Armed Services during the war.
10. Prepare a synoptic analysis of six or eight recent textbooks on methodology as to values, functions, and limitations of audio-visual aids.
11. Study six or eight standard texts in such fields as health, American history, or physics. Report on their use of audio-visual materials.
12. Make a study of your State Department of Education. What is its attitude toward audio-visual education? What, if any, publications pertaining to a-v materials has it distributed? If your state has state courses of study, analyze them to see if a-v materials have been included.

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Chapter 3

THE TRANSMISSION OF IDEAS—A PANORAMA

Since before the dawn of history man has, in one way or another, conveyed to others his wishes and desires. Grunts, grimaces, and poorly co-ordinated gestures were followed in turn by simple and complex speech. Picture writing and hieroglyphics developed into written languages and great masterpieces of crayon and brush. Crude huts, tools, and implements were the forerunners of present day skyscrapers, beautiful homes, surgical tools, dynamos, and locomotives. This list could be extended almost without limit, but what are the more specific ways by which ideas have been transmitted from generation to generation? This is a major problem in education and its bearing on teaching is evident. The object of this chapter is to show that the transmission of ideas (teaching) has evolved as society has evolved, and to relate this evolution to audio-visual education.

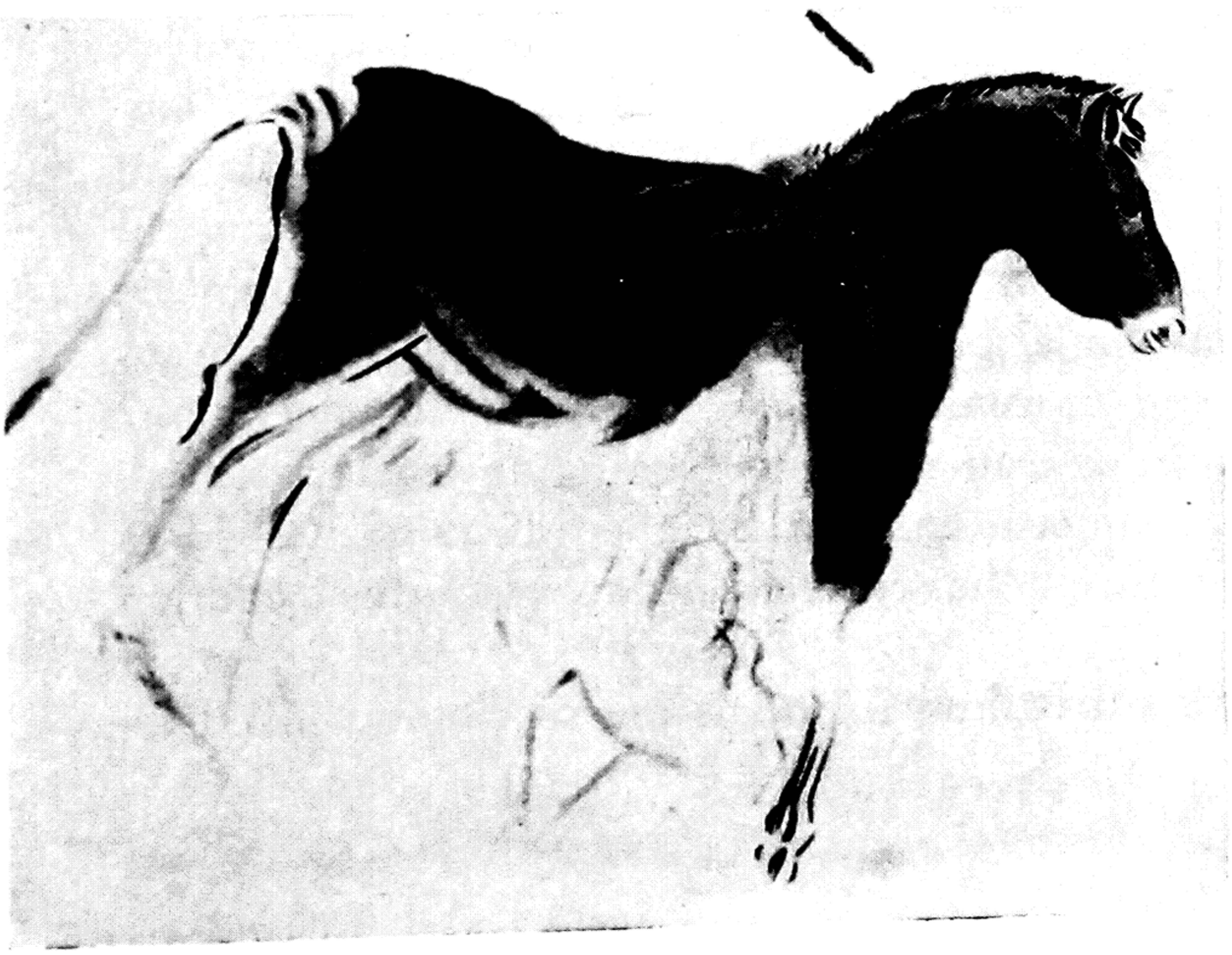
Teaching method and curriculum materials are so closely linked to-

gether that at least a passing reference must be given to this relationship. Technology has enormously increased the type, range, and speed of communication. To refuse to relate these developments to a discussion of school procedures is to be guilty of nursing the lag that exists between schools and the development of society.

PRIMITIVE PEOPLES

Man's early culture and development are sources of knowledge of great value to those who are interested in present-day culture and progress. Somehow, some way, man, starting from "scratch," has made his laborious way upward, arriving at the twentieth century with a phenomenal cultural and industrial civilization. Whether it took him 100,000, 500,000, or 1,000,000 years is of little concern at the moment, but it is important to know that modern man had his beginnings about 10,000 years ago. Anthropologists tell us that during the Paleolithic period man grew in technical perfection and skill in such matters as the making of spear-points, scrapers, and the cutting edges of stone knives; likewise there was improvement in shape, design, and variety of these weapons. Later in the same period man learned how to make bone and horn tools and weapons, how to make fire artificially, how to fashion crude clothing, and how to construct rude huts and shelters. Davis and Barnes present a picture of the significant cultural development of man at that time:

> Not only did Paleolithic man lay the foundations for human material culture; he also made respectable beginnings in the field of art. Among his



Cave Drawing of Primitive Man. Found in Almira, Spain.

AMERICAN MUSEUM OF NATURAL HISTORY

more important achievements in art were drawings and paintings on the walls of caves, carvings on ivory, bone, and horn, and sculptured human figurines. The most astonishing aspect of Paleolithic art was the remarkable colored paintings on the walls of certain famous caves in Southern France and Northern Spain. These paintings were for the most part reproductions of contemporary animals, such as the bison and reindeer, and chromatic art here attained a level of excellence, not matched again until the historic period.[1]

Remarkable as this development was, there were no basic industries—no agriculture, no textiles, no pottery, and no domesticated animals to do man's heavy labor.

During the Neolithic age man continued his advance, but no real strides were made, even though the bow and arrow were further developed, stone implements and weapons were ground and polished, animals were domesticated, agriculture was begun (hoes but not plows used), spinning and weaving of flax had their inception, and art progressed mainly through the beginnings of hand pottery. It was not until the close of the Neolithic period, 4004 B. C., that recorded history made its appearance. The date marks a time of great importance: the plow was evolved paralleling the domestication of the horse and the donkey; the Sumerians of the Caspian area developed wheeled vehicles; and most important of all, oral communication was highly developed and written communication was begun. Although the alphabet was yet to come, someone has appropriately said, the preliterary age was practically at an end.

THE DEVELOPMENT OF LANGUAGE

Man possesses four great advantages over other animals—upright position, free use of hands, brain development, and language. Each has played its role in man's steady elevation. Free hands, for example, have allowed man to become an inventor. Because of vocal apparatus, man has developed into a being with a vocal language which he has gradually developed and synchronized into an alphabet and a written language. In this way, human beings have not only developed their cultural status but have preserved and transmitted it from generation to generation.

[1]Davis, Jerome, Barnes, Harry Elmer, *et al.*, *An Introduction to Sociology*, Rev., pp. 32–33, D. C. Heath and Company, 1931. The same vivid picture of this period is presented by Andre S. Blum and R. R. Tatlock, *A Short History of Art*, pp. 1–5, Charles Scribners Sons, 1926.

Our facts, knowledges, beliefs, practices, skills, appreciations exist and grow through the ages because of communication. It is so important that Dewey writes, "Society not only continues to exist *by* transmission, *by* communication, but it may fairly be said to exist *in* transmission, *in* communication."[2]

Without language there can be no intentional or systematic communication of an abstract or descriptive sort. Language and thought are inseparable. Thinking is done in terms of symbols. Linguistic science tells us that primitive peoples have no abstract ideas because they have no way to express them.

Animals are able to communicate certain physical feelings and states by wagging the tail, arching the back, or uttering warning cries; and they can receive meaning through such oral qualities as tone, pitch, and timbre, and through touch and muscle movement. Whether man's language evolved from animal cries has not been substantiated, because language was language before the dawn of history. It may have developed a million years ago but we have no way of knowing what it was like in its infancy. Though speech is a by-product or a secondary use of physical organs common to man and animals—lungs, larynx, palate, nose, teeth,

[2]Dewey, John, *Democracy and Education*, p. 5, The Macmillan Company, 1916.

The study of communication can be fascinating when taught within children's interest level.

COURTESY OF NEW ALBANY, INDIANA, PUBLIC SCHOOLS



tongue, and lips—it is apparently a form of learned behavior which only the human child can imitate, integrate, and condition into a system.

Verbal language is either oral or written, but in either case symbols are accepted for real objects or acts. It is interesting to recall that an ancient monarch opposed the introduction of writing on the grounds that it would weaken the human memory. The complex verbal systems of today require years to master, but nothing better has been found. Communication or social transmission insures the social heritage, broadens the individual by bringing him into contact with a larger and more varied life both as to time and space, and extends the sensory world; and as the individual is enriched, so is the group.

WRITING AND PRINTING

The earliest known stages of writing were those in which pictographs were used. Direct pictures, not elaborate but distinguishable, were used to describe objects and acts. In the next stage, the pictographs were abbreviated, became more symbolical, and required more abstract knowledge of the reader. As time went on, drawings lost more and more of their perceptual connotations but symbols acquired more meaning. The development of writing in Egypt is a good example of this evolution. At first the hieroglyphics consisted of pictures or figures of material objects from every sphere of nature and art, to which were added many arbitrary symbols. A second development of the Egyptian, the hieratic, reached a point where the symbols almost ceased to be recognizable as representations of objects. The third stage in Egyptian writing, the domatic, first used in the seventh century B. C., resulted in making the symbols still more obscure.

About 1000 B. C. the alphabet was invented. Alphabetic developments are extremely interesting and often quite complex. The English alphabet, like all those of Europe except the Russian, is derived from the Latin which may be traced through the ancient Greek to the Phoenician.

Throughout history many materials have been used for writing surfaces. Early man wrote, figured, and carved in the sand along the beach. Later, baked clay tablets and palm leaf ribs became common media. Archeologists have uncovered a great library of 25,000 clay tablet books at the ancient city of Nineveh dating back to 650 B. C. When papyrus and parchment were widely used, communication took on factors of

relative swiftness, diffusiveness, and permanence. Printing, after its invention at a much later date, was destined to multiply these sociological factors a hundred-thousandfold. Of writing, Professor Breasted says:

> The invention of writing and of a convenient system of records on paper has had a greater influence in uplifting the human race than other intellectual achievement in the career of man. It was more important than all the battles man fought and all the constitutions ever devised.[3]

Printing as we know it today with movable type is credited to Johannes Gutenberg of Germany and Laurens Coster of Holland in the first half of the fifteenth century. The first press in America was set up in Mexico City between 1540 and 1550. The first one in the United States was established at Harvard College in 1638.

Before writing and printing, great limitations were placed on the spread of culture from the so-called "culture bases." What could be transferred from one generation to another was largely dependent upon the memories of men. Although inventions and discoveries have always tended to be revolutionary in their effects upon the *status quo* for a time after their advent—doubtless this was true of the invention of the bow and arrow and the domestication of the dog—the printing press in Europe was several revolutions rolled into one. Certainly its advent paved the way for an educational renaissance. The printing press made it possible for one individual to influence rather directly thousands of people in immediate or remote areas; whereas before, the influence was restricted to personal contact and emissaries. The amazingly rapid and thorough spread of ideas has been owing to modern modes of communication—press, radio, and motion picture—as in the case of the atomic bomb released by the United States in the summer of 1945.

The development of communication can be concisely summarized by a quotation from two sociologists:

> In the first place, the alphabet represents the union of the vocal and graphic arts; in the second place, came the development in writing which greatly extended the currency of ideas; and thirdly, there are those mechanical inventions that have resulted in world-wide transportation and communication.[4]

[3]Breasted, J. H., *The New Past,* quoted by Davis, Jerome, *et al., op. cit.,* p. 70.

[4]Davison, Carl A., and Gettys, Warner E., *An Introduction to Sociology,* Revised, p. 271, The Ronald Press Company, 1935.

A provocative point of view on communication has been raised by Aughinbaugh of the Ohio Slide and Film Exchange.[5] Separating communication into audio communication and visual communication, Aughinbaugh contends that the visual is a universal form. And, paradoxically, the invention of the printing press all but stopped the evolution of visual communication because it substituted words or audio records for visual records. (Aughinbaugh classifies printed words as auditory because they are symbols for sounds.) The eyes nearly surrendered to the ears. Modern developments are helping to restore visual communication to its pristine eminence. Arguing that man is 90 per cent "eye-minded," 5 per cent "sound-minded," and leaving 5 per cent for the remaining senses, he holds that man sought ways and means of recording the various sensory images in the order of their importance to him. Thus, if the sensations of smell or taste had been of prime importance, man would have loosed his inventive genius on ways to record and transmit these images instead of the visual and audio. So clear, useful, and important are visual images that when we use the term *image,* we almost always have in mind *visual image.*

Aughinbaugh presents another challenging idea when he comments on the custom that devotes most of the time of the first four years of school study to teaching the child to read because society has the idea that knowledge can be had only through reading.

> Present procedures give the child the bare mechanics of this artificiality [reading] without a sufficient background of visual experience to make the instruction desirable, understandable, or palatable. With a store of visual images to draw upon, which, . . . constitute ninety per cent of all imagery, the child might learn with little effort in his fifth and sixth years of school all the mechanics of reading that he now so painfully learns during his first four years.[6]

Truly here is a challenging thought. It is bound to annoy some people and its practicality is open to investigation. Psychologically, the power of the printed word lies in the fact that so many worth-while things have been printed. It is almost inconceivable to some that the printed page could not be significant. Yet more and more books include more and

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[5] Aughinbaugh, B. A., "The Evolution of Visual Communication," *Audio-Visual Guide,* 11: 20–26, November, 1944.

[6] *Ibid.,* p. 26.

more pictures, so that the all-picture book may be a real possibility. Instead of nouns and verbs there would be things and actions.

Once printed materials and travel were the only forms of communication, but today hosts of new forms are taking their places alongside the older forms. These newer forms are often referred to as mass media of communications because they reach so many people simultaneously. Not only do they reach many people at one time, but the impact which they make is enormous. They tend to approach a universal language. Like everything else they have their limitations, but verbal language, too, has its limitations as Hooton points out:

> It is more pertinent to inquire whether man's use of language has not contributed as much to destruction of himself and his civilization as to his preservation and its upbuilding. Although language is the universal possession of all races of homo sapiens, the diversification of speech has been so extensive and so rapid that the world's population from prehistoric times has consisted of many smaller or larger groups whose articulate and written communications are, for the most part, mutually unintelligible. Thus, whereas the common possession of speech might be expected to unite men, inasmuch as it enables them to understand each other's thoughts, motives, and cultures, the reverse is the case. Language erects more barriers than bridges. There is, apparently, in man an ineradicable tendency to dislike, to distrust, and to judge as inferior the individual or group which speaks a language unintelligible to him . . .
>
> It therefore may be argued that, in a broad sense, language has destroyed as much of culture as it has produced. It is also conceivable that imperfect and garbled translations from one language to another have produced more misunderstanding and discord than would have arisen between groups with mutually unintelligible languages, or without any language at all.[7]

Textbooks. Since this chapter is an attempt to present an overview of the development of the ways and means of transmitting ideas from generation to generation, and thereby involves a brief mention of many forms of culture, it seems appropriate to insert a note concerning the evolution of textbooks.

In the seventeenth century there appeared one of the most commanding advocates of sense realism, both in theory and practice, ever to grace the pages of educational history—Johann Amos Comenius, or Kominsky. He was disgusted with the verbalism and pedantry of his time, and

[7]From *Apes, Men and Morons,* by Earnest Albert Hooton. Copyright, 1937, by G. P. Putnam's Sons. Courtesy of G. P. Putnam's Sons.

insisted that the teaching of words and things must go together. In order to correct some of the narrow language study of his time, in 1658 he wrote *Orbis Sensualium Pictus,* or the *World of Sense Objects.* This was an illustrated primer and first reader, and was the first illustrated book written for children. Among the 151 chapters of this reader were such titles as Fire, Earth, Trees, Flowers, Birds, Bees and Honey, Cookery, Weaving, Barber, Schoolmaster, Printing, Temperance, and Humanity. Each chapter was illustrated with a picture, following which there were two parallel columns of text, one in Latin and one in the vernacular, with numbers attached corresponding to numbers in the picture. The pictures, therefore, served to explain the text. Here was a revolutionary method of teaching reading, a "method of dealing with things and of leading by inductive process to a generalized knowledge." This book was translated into many languages and was a foremost textbook for two hundred years.

The forerunner of the interesting, vivid, scientifically illustrated modern textbooks has just been described. The illustrations were crude woodcuts, a far cry from modern engraved and lithographed multicolored illustrations. Little by little the art of engraving and printing progressed; many inventions and processes were needed before modern texts became possible. Millions of volumes are now produced every year by high-speed rotary presses, linotype machines, and photo-engraving processes.

ELECTRO–COMMUNICATION

The history of the interchange of thoughts or the imparting of skills and knowledges may be classified roughly as follows:

1. Imitation
2. Word of mouth
3. The press and books
4. Electro-machine

The first three of these ways of passing on knowledge have already been discussed. Up to the time of the Industrial Revolution only the first three had shown any appreciable advance. Even printing and bookmaking were in a more or less pioneer stage of development. Only a little more than a century has passed since the Industrial Revolution, yet man's accomplishments in this short temporal span have changed the face of the earth more than the thousands of preceding years did.

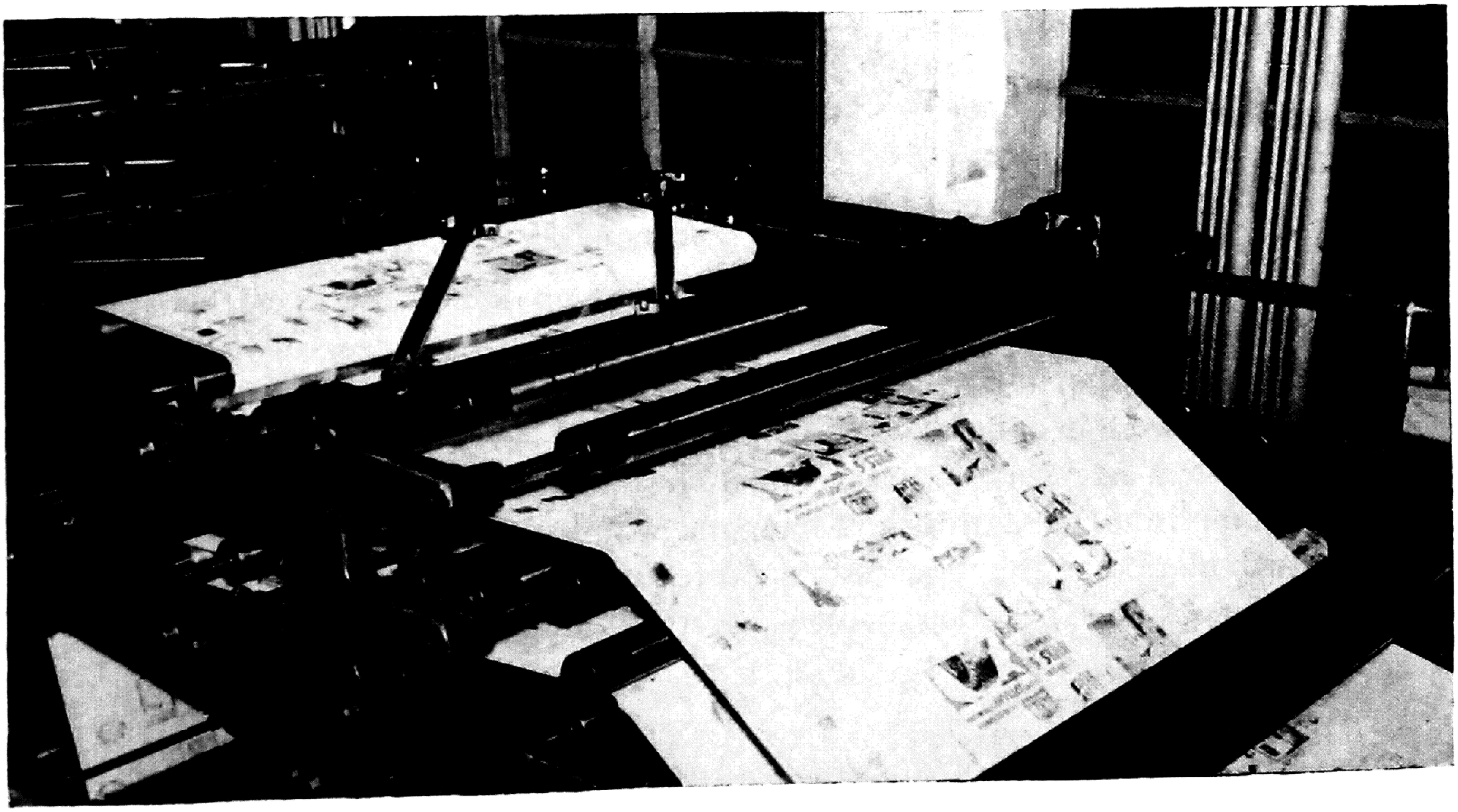
Among the inventions which directly or indirectly affect communica-

tion and therefore culture and its transmission, mention will be made here of the steamer, railway, motor car, aeroplane, camera, typewriter, telephone, telegraph, ocean cable, rotary press, improved typesetting machinery, facsimile transmitter, shorthand writing, shorthand-typing devices, phonograph, dictaphone, radio, motion picture, and television. So important have been the communication inventions that they are said to have initiated a second industrial revolution.

Newspapers. Modern newspapers rank alongside printing and bookbinding as social inventions. Although newspapers are not, strictly speaking, electro-machine communication, except in their production, their speed and mechanical arrangements cause them to fit into the machine classification very neatly. The 1947 International Yearbook of *Editor and Publisher—The Fourth Estate* lists 1,763 daily newspapers and 497 Sunday papers in the United States. The circulation of these papers is 50,927,505 and 43,665,364, respectively. To this volume can be added the output of nearly 10,000 weeklies, 100 foreign-language publications, and 150 Negro dailies and weeklies. A modern press is able to print, cut, fold, and deliver in quires, 60,000 copies an hour of a newspaper containing thirty-two pages. The only limitation to the speed of printing appears to be the breaking strength of the paper as it races through the

The modern newspaper is a powerful medium for the communication of facts and ideas. The newspaper is a social invention.

ACME



presses. To these publications might be added an astounding array of statistics of weekly and monthly papers, annual reports, bulletins, house organs, magazines, journals, and bound books of all types. Even the number of textbooks, both titles and volumes, is staggering. But statements of quantity do not give an altogether accurate picture. H. L. Mencken is reported to have said that the average man understands only about two thirds of what comes from the lips of the average political orator or clergyman. How much, then, does he understand of that which he sees on the printed page? The English dictionary now carries the astonishing total of more than 700,000 words.

Magazines. Weekly, monthly, and annual magazines, journals, and yearbooks contribute further to the stream of mass communication through the printed word. Between a dozen and fifteen United States magazines have a circulation of 2,000,000 or more, with perhaps another group of eighty to one hundred claiming a circulation of 100,000 or more. One magazine alone is reported to have reached a domestic circulation of 8,500,000 with another 1,500,000 accounted for by Swedish, Portuguese, Spanish, Arabic, Danish, and Finnish editions. To these enormous circulations must be added the smaller journals—juvenile, adult, technical, and professional.

Facsimile Newspapers. In Chapter 18 the reader will find an extended discussion of the facsimile recorder. This is one of the many electronic miracles in communication. From a transmitting station, news is broadcast by wireless and is picked up on specially designed receiving sets, not as aural radio or the images of television but as a reproduction on paper. A facsimile newspaper can be broadcast late at night over FM transmitters at an hour when the FM channels are relatively unused for the usual radio purposes. The facsimile newspaper is recorded during the night in the receiving set which is left open for this purpose. Consequently, every morning a newspaper is ready in every home before breakfast, not delivered to the doorstep, but in the living room beside the radio. No presses are involved in the printing; no deliveries, no dealers, no newsstands. It can be broadcast over the wave length distance of the FM station which handles the service.

Is it expensive? Yes, at present, because it is in its infancy. Equipment is experimental and not produced in mass, but experts say that a receiving set will eventually sell for $100 to $400. Specially constructed paper

must be used to receive the facsimile. This now costs about four cents for a four-page facsimile, but again, the estimate is that this cost can be reduced to one cent. The present thinking of journalists and newspapermen about the facsimile recorder can be summed up as follows, "It will supplement, but not replace, the large metropolitan newspaper as we know it today."

Camera. Photography is closely related to the inculcation of ideas and the preservation of the social heritage. Photographic reproductive printing, illustrations in books and magazines, camera prints, motion pictures, and a hundred other photographic uses bear directly on our daily lives. In addition to its function as a means of communication, the camera has become an art medium.

Motion Picture, Radio, and Television. These are the "big three" in modern electro-communication. They are all relatively new, and have made their appearance in the order named. Motion pictures are concerned essentially with visual communication, radio with audio, and television with both. Motion pictures are delayed or recorded impressions (the object or act is photographed and then developed before it reaches the audience); radio is immediate but is confined only to sound; whereas television combines the immediacy of the radio and the act or scene of the motion picture. The first two of this triumvirate are now accepted as essential features of every well-equipped school. Television has passed the experimental stage and will take its place alongside the other electro-machine devices for communicating ideas to homes and schools. No longer is the schoolboy solely dependent upon the printed page for his knowledge, attitudes, and understandings. Scholastic formalism is being broken up and a natural interconnection exists between perceptual and conceptual learning. Children may see, hear, smell, taste, and feel their environment, listen to lectures, read books, see and hear cinematographic events, hear radio reports, and see and hear televised accounts of world events and affairs just as they happen. With these interesting and varied stimuli, concepts should be richer and fuller.

Teaching, which is partially concerned with the transmission of ideas, has been enormously aided by technology. Science has brought forth a new world of curriculum materials. It is no wonder that people say there has been a "communications revolution." Mass communication, begun by the invention of the steam-driven press, has been perfected and ex-

This chart shows communications in the order of their development as instructional media. The chart should be read vertically rather than horizontally since items are not arranged in strict chronological order, nor has any attempt been made to show overlapping. Although shown here as distinct developments, actually they influenced each other.

Aural Instruction
Tutor

↓

Development of Printing

- Manuscript Books and Hand Illustrations
- Hand Set Type and Illustrations (Woodcuts, Steel Engravings), Charts, Maps
- Mechanically Set Type and Photo-Mechanical Engravings
- Books, Magazines, Papers, and Illustrations in Mass Production

Development of Visual Communications

- Photographic Prints on Tin and Glass
- Lantern Slides
- Camera Prints on Paper
- Stereographs
- Silent Films
- Filmstrips
- Sound Films Black and White and Color
- 2″ x 2″ Slides

Development of Audio Communications

- Phonograph Records
- A.M. Radio
- Transcriptions
- F.M. Radio
- Television
- Wire and Tape Recording
- Facsimile

tended by electro-machine devices so that mass communication of word, sound, and image is a reality. The impact of these new technological devices will be felt both in the classroom and the world outside.

Until recently man has perpetuated his experiences either by recording them with the printed word or by drawing and painting. These records have then become the materials of instruction, but now the range and variety of curriculum materials have been increased. Strangely enough, new devices do not crowd out the old ones, they merely enrich the learner's educational possibilities. Here, briefly, is how they work. *Hamlet* is usually taught from a book, a printed record, but it might more appropriately be taught by seeing it enacted on the stage, since Shakespeare wrote his plays to be acted out on the stage, not to be read and dissected in class. Other curriculum materials for teaching *Hamlet* are records, the sound motion picture, and television.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Progress in the development of communication or the spread of ideas has been phenomenal in the past two hundred years. For the purpose of discussion, consider the development by fifty year intervals as 1800, 1850, 1900, and 1950. Try predicting for the year 2000.
2. The development of mass media of communications has undoubtedly raised the educational potential for society, but is it possible that man may become enslaved by some of these media? How does the propaganda machine of a totalitarian nation use mass media of communications to achieve its ends, even among otherwise intelligent people?
3. At one time some psychologists held that the individual repeats the race history (ontogeny repeats phylogeny) in his development. If this theory were true, the child by the age of six would have lived through thousands of years of man's history. What part does sensory training play in the early education of the child? To what extent does this education represent the history of the race?
4. Compare what you might learn about a person (1) by seeing him frequently without exchanging words, and (2) by an intimate correspondence without seeing him?
5. Read the article by Aughinbaugh. Discuss its merits. What are its implications?

LABORATORY EXERCISES

1. It is suggested that the discussion on "The Transmission of Ideas" can be more dynamic by showing motion pictures which dramatize the topic. The following films are all quite good.
   (a) THE DAWN OF ART. 16-mm., 2 reels, 14 minutes, sound, color. This film was produced by the art students of Antioch College, and

shows the motivation of primitive man in his art work. The film re-enacts the cave dwellers of Southern France decorating the walls of their caves with crude paint and instruments.

(b) OVERCOMING THE LIMITATIONS OF LEARNING. 16-mm., 2 reels, 15 minutes, sound, black and white. Produced by Encyclopedia Britannica Films, Inc., Wilmette, Illinois. This film consists of sections taken from a large number of standard classroom pictures and shows how the mechanical features inherent in sound films overcome such limitations to learning as time, space, sight, and lack of sound. These excerpts or "shots" from the existing library show the various techniques that are used in making Britannica's classroom films, such as telescopic photography and animated drawings.

(c) ANCIENT WORLD INHERITANCE. 16-mm., 1 reel, 10 minutes, sound, black and white or color. Produced by Coronet Instructional Films, 65 E. South Water Street, Chicago 1, Illinois. The study of ancient civilizations begins with the relationship of modern times to the Ancient World. By a visual comparison of the ancient with the modern, the film shows how such everyday articles as textiles, paper, agricultural implements, and such institutions as writing and organized law are inherited from the cultures of the Egyptians, Babylonians, Assyrians, and other ancient peoples.

(d) OUR SHRINKING WORLD. 16-mm., 1 reel, 12 minutes, sound, black and white. Produced by Young America Films, Inc., 18 East 41st Street, New York 17, New York. Excellent summary of the history of transportation and communication from primitive times to the present, including the story of inventions concerned with transportation. The concept of a shrinking world brought about by speed of transportation which hurdles oceans and mountains is clearly shown.

(e) THE 26 OLD CHARACTERS. 16-mm., 2 reels, 25 minutes, sound, black and white, 1947. Sponsored by the W. A. Shaeffer Pen Co., distributed on free loan by Jam Handy Organization, 2900 E. Grand Boulevard, Detroit 11, Michigan or 1775 Broadway, New York. The film visualizes and explains the origins of writing, beginning with picture writings and drawings on prehistoric cave walls, and traces the development of writing down to the present day.

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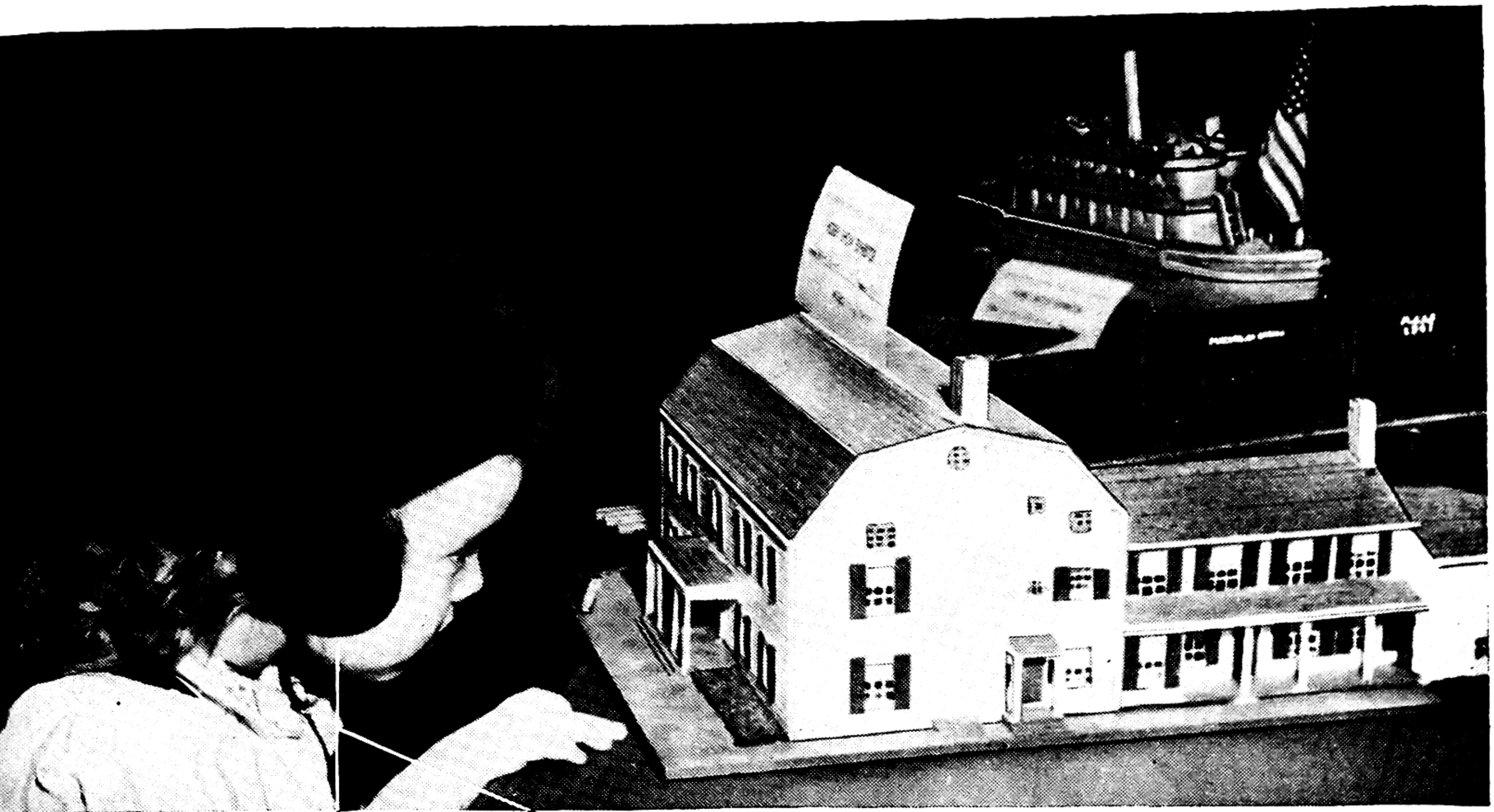
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Chapter 4

THE ROLE OF THE TEACHER IN PERCEPTUAL LEARNING

THE EXPERIENCE THEORY OF LEARNING

Anything that increases the ease of learning may be called a teaching aid, not with the connotation of crutch, but of tool or material. Pictures, specimens, maps, globes, charts, diagrams, books, and models are some of the materials which are used in facilitating the learning process, although words are the chief tools. Listening, reading, conversing, reciting, writing, drawing, visualizing, manipulating, building, and creating are the foundations of the methods employed. As human progress moves in cycles, both teaching materials and methods appear, fall into disuse, and some re-appear.

During recent years a gradual emergence of an experience theory of education has been witnessed. Perhaps it would be more appropriate to say that this is a re-appearance of an older theory. Time was, of course, when direct experience was the chief, if not the sole, method of learning. In the centuries which followed the invention of the printing press,

reading was practically worshiped. Abuses crept in and educational reformers cried out against the formalism of the schools. This is why the names of Comenius, Rousseau, Pestalozzi, Montessori, Parker, and Dewey have so much significance. These and other educationalists did not decry the value of language as a medium of conveying experiences, but they did rebel against the use of meaningless words, formularies, and pedantry. Words and phrases have meaning only insofar as they assist in the processes of thought, in classifying, in generalizing experiences based upon direct associations or indirect associations with activities already known. The heavy hand of verbalism will be further discussed later in this chapter.

The manner in which children learn cannot be restricted or isolated. When the child studies algebra, he also learns social behavior; when he studies geography, he learns art; when he studies *Macbeth,* he learns the inner motivations of men. The quarrel with education of the past is that too often it was an end in itself. "Subjects" were organized, withdrawn from the focus of life outside the classroom, placed in a vacuum, so to speak, and then academically dissected.

At one time psychologists generally devoted separate and often lengthy chapters to sense organs, sensation, perception, memory, imagination, ideation, willing, thinking, judgment. More recently authorities approach these topics as parts of a related whole and show the interaction of each on the other to effect total behavior.

The genetic, or developmental, approach of the latter seems much more fruitful. The present volume on visual and auditory materials and techniques of instruction, prepared for students in education institutions and for in-service teachers, assumes that its readers have a satisfactory background in psychology. Accordingly, only a summary treatment of the various learning stages will be given. The chart on page 46 shows the ascending order of the various mental activities. At the bottom of the diagram the processes are largely concrete, and those at the top are abstract and symbolical. It must, however, be borne in mind that behavior is not simply a matter of one or the other. All stages are more or less interlaced; particularly do the processes at the top of the diagram rest upon the lower processes as foundation stones. Even the most involved conceptual and generalized thought cannot be divorced entirely from its world of concrete reality. Clearness and definiteness are essential to correct symbolical treatment.

Practical geometry supplements theory for these interested high-school students.

COURTESY OF ST. LOUIS PUBLIC SCHOOLS

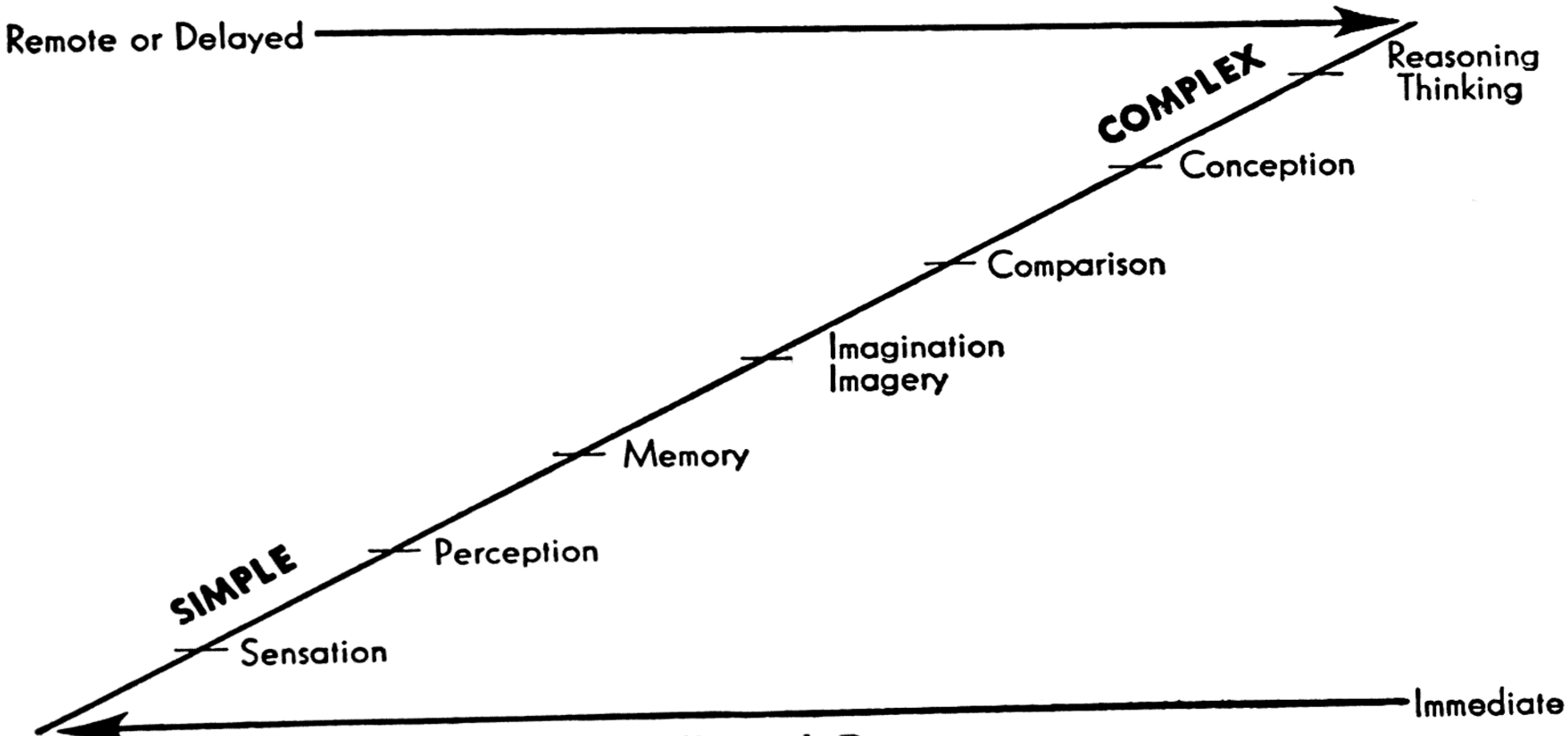


Perceptual Learning. It is a truism to say that good thinking depends upon the possession of a large variety of clear-cut *percepts*, a meaningful background. Percepts develop from simple beginnings. They are sense materials, plus meaning or experience, or in other words, perception is the totality of experience connected with a sensory object or fact. Perceptions are learned. They increase in accuracy with training. "Cues" are more easily and accurately interpreted until finally, well-rounded perceptions may involve form, size, color, distance, movement, and the like, and always they must square with a real, concrete world. In short, perceptions are chiefly habit reactions to familiar "cues" which have occurred and re-occurred in similar situations.

Conceptual Learning. As perceptions become fully understood, their meanings are classified into larger and more meaningful hierarchies, or generalizations, which are termed concepts. An orange with its color, form, odor, texture, and the like, plus its verbal symbol, is a percept; but when this percept is extended to include definition, geographical distribution, social and economic value, it may appropriately be termed a concept which differs from ordinary mental association primarily in depth. The concept is farther removed from the immediate and may in-

volve thought processes such as suspended judgment, comparison, contrast, discrimination, and the like. Such abstractions as morality, social good, universe, and government, along with all their characteristics and properties are examples of conceptual meanings. Like percepts, concepts must square with the world of concrete reality or absurdity is the result.

Since concepts grow from practically nothing at all into full understandings, their maturity depends upon a proper environment and a state of flexibility. This is where the teacher, the community, the methods,

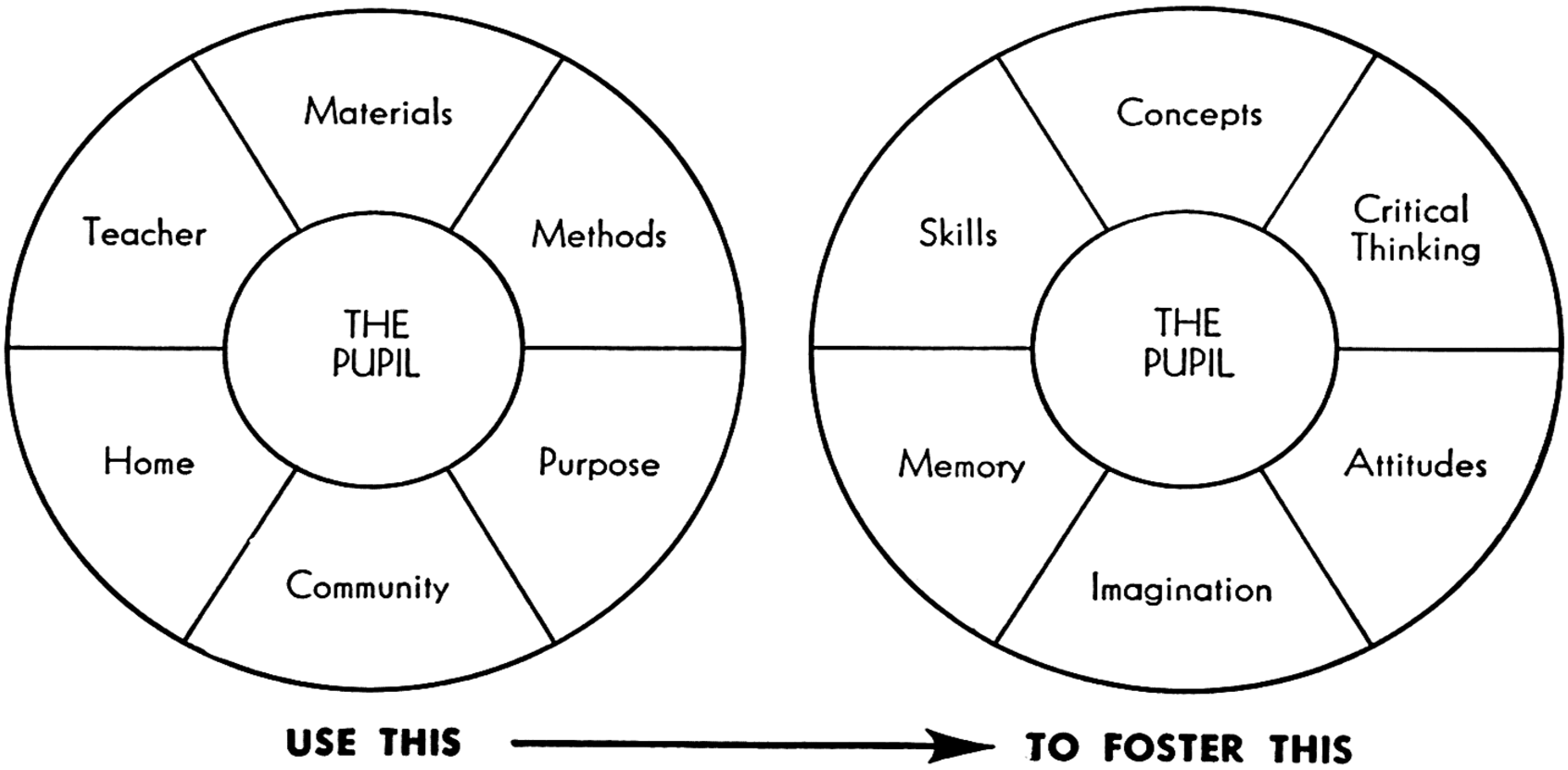


Intellectual Processes

and the curriculum materials become important. Under certain conditions conceptual growth is dwarfed or becomes narrow and provincial with such unwholesome mental states flourishing as ignorance, superstition, prejudice, and hate. They are weeds in the conceptual garden. Under other conditions the tolerant, many-sided citizen is developed.

It is fitting to ask, how do concepts develop? They grow through familiarity with the thing from which they derive their original association. A concept such as *anvil* is gained through personal experience with this object—its size, weight, shape, surface texture, "ring," and use. In the absence of the real object, pictures or simulated models will assist materially in gaining the concept; mere description adds little. Unless this basic concept is learned how can the pupil fully understand and appreciate the poem "The Village Blacksmith" or the "Anvil Chorus" in *Il Trovatore* when he comes upon them at a later time?

Concepts are of many varieties. There are those of a concrete nature which deal with things and are on the whole more easily and quickly learned. Other concepts are abstract and consist of ideas or systems of ideas. Many concepts have a variety of ramifications as, for example, the formula. A formula is not just a recipe or a prescription. It may be a creed, a type of slogan, a statement of words which has become stereotyped by continuous association, or it may be an arrangement of symbols representing objects or principles. H_2O is a formula for water and



$(a + b)^2 = a^2 + 2ab + b^2$ is an algebraic formula. How, then, are such concepts developed? Is it sufficient for the pupil to go to the dictionary and copy out a definition? Hardly. Episode and illustration are better means. Repeated examples will nurture a cumulative growth. Working with formulas, talking about them, discussing their values and limitations, provide the direct experiencing that is essential for full understanding.

Research has shown conclusively that much of the difficulty that children have with number concepts is owing to the fact that they are ushered into the higher quantitative concepts before they are ready—before they have sufficient perceptual number understanding. Ordinary number combinations are fully understood not just because of extended drill and repetition of formulas. To be able to count and to use the words which signify numbers assure no particular mastery of number combinations. A full and complete knowledge of symbolic numbers begins with manifold concrete experiences which, with the appertaining rules and systems,

are gradually built into conceptions or generalizations. It is important to note that social understandings are developed in like manner, and only upon definite knowledge can correct thinking be built. Rules can best be understood and remembered, not if memorized by rote, but by being thought and worked out and related. Multiplication combinations are usually memorized from book or teacher, but their meaning would be greater for the learner and their ease of retention facilitated if students were required to work out the combinations—to see where they come from, how they are derived.

It is possible to keep the learner too long on a perceptual basis, although this is less likely to happen than his being rushed into new levels before he is ready for them. When perceptions are being taught, it should be remembered that they have numerous angles; and repetitive presentations should try to show the object, thing, or event against as many backgrounds as possible, because its later occurrence may be under novel circumstances. In this way simple perceptions are developed into hierarchies which ease the transition to conceptual levels.

The principle just posited is nicely illustrated in the teaching film *What Is Four?* This film builds up the concept of "four" by showing its occurrence in many things in life, as wheels of a wagon and feet of a horse. It also shows that four results from combinations of three and one, one and three, and two and two. In similar manner, four results when one is taken away from five or two from six. Plentiful use is made of varied illustrations.

Imagery in Learning. Images are based upon sensations and perceptions, without which no images or at least no clear images would exist. The lack of clearly defined images leads to misconceptions. Individuals with sensory handicaps are at a great disadvantage. Few individuals with the handicaps of Helen Keller or Laura Bridgeman can overcome these disadvantages and be able to dwell in a world of vital living images. It is difficult to conceive of the care and patience necessary to instruct persons with these basic sensory handicaps. Sensory experiences are the raw materials from which perceptual and conceptual experiences are wrought.

Images are, however, more closely related to thinking than mere perception. They are further removed from sensations and are more amenable to treatment by the higher mental processes; but images cannot

transcend all sensory and perceptual experiences. Mental images are sired by direct associations or associations related to direct association. They are not outright creations, they do not spring forth spontaneously. There are so-called flights of imagination but even these have concrete, though possibly obscured, foundations. These flights of imagination are valuable only as they conform to an objective world. The child's fancy is not free and uncontrolled as many people seem to think. It is based upon reality. The following excerpt is a good example of the heart's desire of a child of four. It was copied down by his mother as the child made it up and chanted it off while he sat in his bathtub every morning:

> He will just do nothing at all,
> He will just sit there in the noonday sun.
> And when they speak to him, he will not answer them,
> Because he does not care to.
> He will stick them with spears and put them in the garbage.
>
> When they tell him to eat his dinner, he will just laugh at them,
> And he will not take his nap, because he does not care to.
> He will just sit there in the noonday sun.
> He will go away and play with the Panda,
> And when they come to look for him
> He will put spikes in their eyes and put them in the garbage,
> And put the cover on.
> He will not go out in the fresh air or eat his vegetables
> Or make wee-wee for them, and he will get as thin as a marble.
> He will do nothing at all.
> He will just sit there in the noonday sun.[1]

The mental image acts as a substitute for direct sensory impressions and perceptions, making it unnecessary to re-experience an occurrence directly. The image is a short cut and a timesaver in learning. If one has seen "Old Faithful" in action, it is perfectly feasible to reconstruct rather accurately his experiences with geysers. But, although a memory image is a great advantage, it also has its disadvantages. It is not possible to check parts of the picture which may have faded out; consequently, mistakes in present action may result if it is based solely on memory images. Furthermore, images tend to be colored by the conditions under which they were given birth. For this author, a trip to the Grand Canyon was pleasant from beginning to end—a joy and a delight throughout. At

[1]Copyright 1939 by Wolcott Gibbs. Originally published in *The New Yorker*.

a subsequent date some unpleasantness arose—car trouble in a broiling midday sun and what seemed to be a rebuke by a park attendant. Perhaps the two images tend to cancel out to some extent, and a fairly objective picture results, but certainly one without the other would be a different thing. In evaluating images, it must be remembered that the possibilities for individual differences have no bounds.

Not all things or events can be experienced directly. How then are images constructed? *Tangelos* and *tangelolos* are fruits which are uncommon for most people, yet a mental image of such fruits is not an impossibility. They are citrus fruits. The first is a cross between a tangerine and a grapefruit, and the other is a mixture of orange, tangerine, and grapefruit. The components of the tangelo and of the tangelolo are perfectly familiar and with the citrus fruit generalization no one would confuse these fruits with a pumpkin. It is not difficult to surmise the texture of the fruit, juiciness, flavor, even color. Not all imagery is as easy as this. For example, it is rather difficult for most people to visualize life in Arabia owing to the fact that experiencing in this area has been wholly vicarious. Or what was the appearance of the countryside at Concord, Massachusetts, on the morning of April 19, 1775? Images such as these are difficult to form, yet they have been formed.

There is no verbalism here. The "day-night" phenomenon can be clearly understood through demonstrations.

COURTESY OF YOUNG AMERICA FILMS, INC.



The Higher Mental Processes. It has been said that the world's greatest need is learning. It has been pointed out that there are various levels of mental behavior. Such mental processes as sensation and memory are comparatively low in the scale of experiences, and man, using these solely, makes but little contribution to learning; but as his understanding progresses to the point of generalizing, abstracting, discriminating, reasoning, and forming judgments, largely through language and other forms of symbolism, he reaches the point of greatest mental productivity. The ability to acquire and use symbols is the most characteristic aspect of human intelligence.

As complex experience grows, there is a need, even a demand, to think clearly, qualitatively, descriptively, abstractly, and symbolically, but let us not forget that even though there is need for the abstractions enumerated, we must be able to translate the symbols back into the experience for which they stand.

THE AUDIO-VISUAL APPROACH TO TEACHING

The greatest sources of learning, in order of greatest effectiveness, are:

1. Experiencing a thing directly
2. Seeing a picture, film, or model of the thing
3. Being told about it by one who has experienced it directly
4. Reading about it

The following outline attempts to show the various kinds of experiencing and their approximate remoteness from direct and purposeful experiencing. Even a casual consideration of this outline will show the value of audio-visual curriculum materials in the learning process. It is obvious that much learning simply cannot be organized so that pupils can experience it directly; even if desirable, such a condition is impossible. At the same time, there are those students who can profit only to a limited extent from verbal or visual symbolizing, and some types of learning cannot be acquired in this manner at all. It is important to keep in mind, though, that a heavy concentration of the more remote types of vicarious experiencing is inefficient.

A. DIRECT EXPERIENCING THROUGH ACTIVE PARTICIPATION: DOING FIRST-HAND, WORKING WITH REAL SITUATIONS

1. Running for political office
2. Making a living

3. Playing a game
4. Acting in a play
5. Painting a mural
6. Being in a cyclone

B. VICARIOUS EXPERIENCING

1. Through direct observation
   a. Seeing a play, e.g., *Macbeth*
   b. Watching how a letter is cleared through a postoffice and passed on for delivery
   c. Watching a machinist sharpen tools
   d. Observing a candidate for political office "meet the press," address rallies, and buttonhole voters
   e. Watching a demonstration by a home economics teacher
   f. Studying an exhibit
2. Through pictorial representation
   a. Seeing motion pictures portray events, characters, processes, etc.
   b. Studying photographs and other flat unprojected pictures
3. Through graphical representations
   a. Using maps, globes, and charts to show distances, areas, locations and other features
   b. Using diagrams and similar devices to show functions, relationships, etc.
4. Through aural or verbal experiencing
   a. Listening to or working with or through the use of radio, records, transcriptions, and television
   b. Listening to narrations or descriptions of events, persons, places, or things, by people who experienced the referent first hand
   c. Using "resource persons"—the so-called authority person
5. Through symbolic experiencing
   a. Using visual symbols as found in the more complicated charts and diagrams (flow charts, dimensional charts, etc.)
   b. Using blueprints, floor diagrams, elevation contours, etc., as found in drawings of architects, layout designers, engineers, toolmakers, and surveyors
   c. Using verbal symbols—abstractions involved in words used to denote qualities, events, processes, relationships, conditions: formulae; technical symbols (H_2SO_4); coefficient; indices; or other abstract signs so far removed from reality as to have no direct relation to the referent. Much of the conventional school curriculum falls in this category

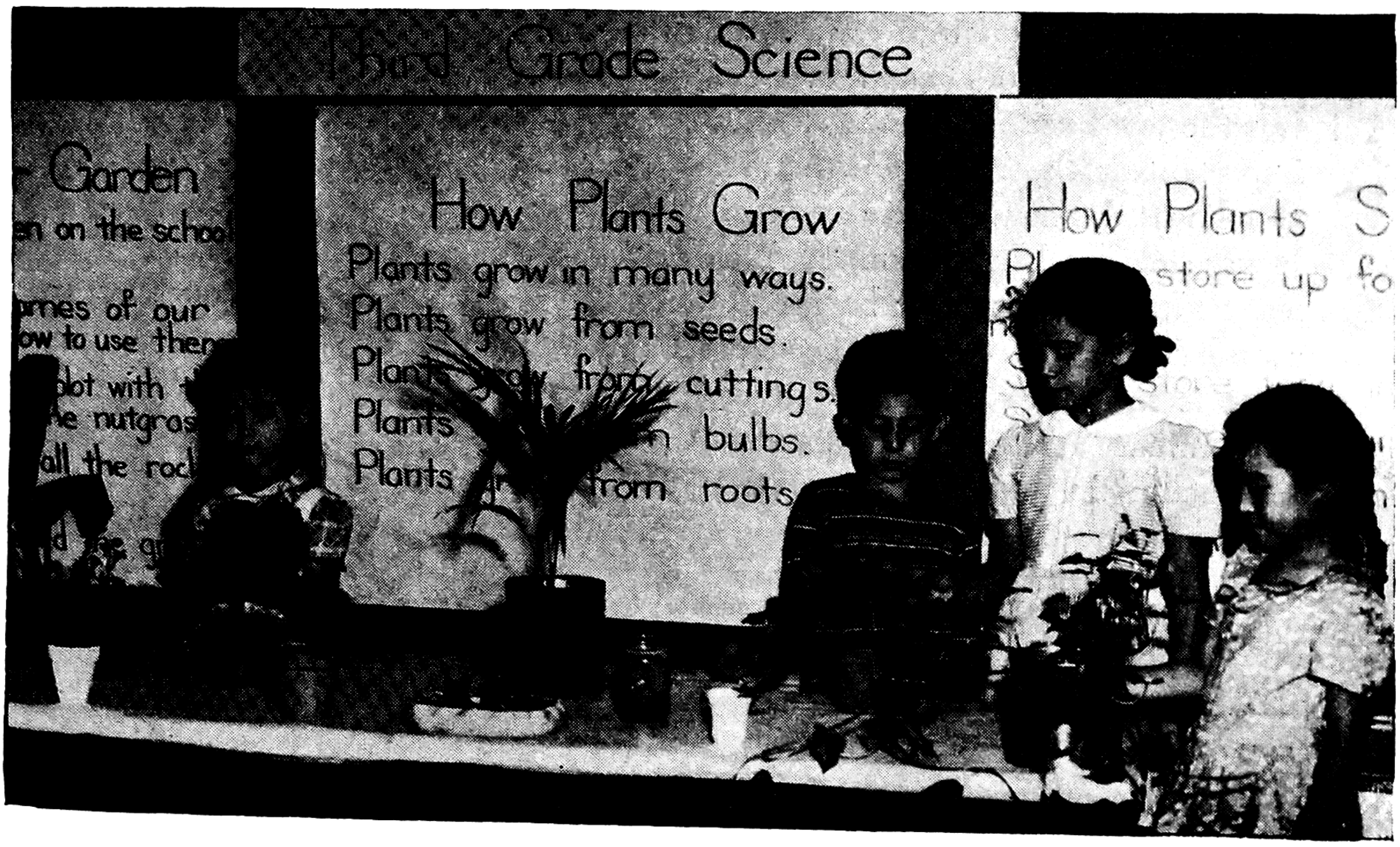
Verbalism. Psychologists classify imagery into two types—concrete and abstract, or object and word. Both types are needed. The object type

is more elementary and more closely associated with the senses. The abstract, or word type, depends more upon the higher mental processes. It is the teacher's task to cultivate all types and to lead the learner gradually into the more symbolical types. Verbal imagery is absolutely necessary to a civilized society. Some of the school subjects are replete with concrete (chiefly visual) images: literature, geography, history, nature study, and biology; mathematics and grammer are largely symbolical. It is a fact easily observed that many of the beautiful narrative and descriptive passages of English prose and poetry are lost to pupils because they do not have significant knowledge of the word symbols involved, in spite of the excellent word pictures in some of the readings. But textbooks about subjects, conventionally encyclopedic in manner and type, have never been known to excel in vivid imagery. Many school curriculums have become devitalized of images. This must be corrected. It is easy enough to see what is happening to children's learning by focusing on a few examples of absurdities and incongruities resulting from lack of proper imagery and perceptual and conceptual backgrounds.

There is scarcely an educational psychology or treatise on teaching methods extant which does not call attention to the evils of verbalism. The surprising thing about it is that not very much is done about it.

Through direct experiencing these children understand the words they use.

COURTESY OF HAWAII DEPARTMENT OF INSTRUCTION



Here and there a teacher or an administrator has recognized the evils of meaningless study and has taken steps to correct it. It is, however, easy to be guilty of following along day after day, "pouring" knowledge into the heads of children. Something in American education or American attitudes has caused us to worship words called knowledge.

Verbalism is usually defined as wordiness or empty, formal words. This may take several forms. Ordinarily the term verbalism is applied when pupils have only a vague knowledge of the words they use, or when the words are known in a limited use instead of in their complete setting.

One writer prefers the term *verbal counterfeiting*[2] to verbalism. Learning, whether it be in the form of skills, concepts, attitudes, or appreciations, is difficult. The learning of concepts is of course much more difficult and complex than the learning of skills, and it is in this connection that so much of the verbal counterfeiting occurs. Pupils read or listen to concepts formulated into words. Soon they are able to use these same words, apparently without error, yet they by no means understand the concept. Educators, quite generally, grossly exaggerate the pupil's ability to acquire and understand concepts. Hence Billett makes the seemingly paradoxical statement, "Teachers in general must learn to teach less and to teach more."[3]

Words or other symbols without associative meanings are useless. Only a little probing in nearly any class will show the extreme prevalence of verbalism. In a recent observation of a high-school biology class, devoted to a discussion of ventral ganglia, the first lesson on this subject, it was noticed that the word *ganglia* was defined, but at no time during the hour was the word *ventral* given any attention. In this case the adjective is as important as the noun. Furthermore, at no time was the singular of ganglia used, nor was there any mention of the fact that this is a plural. It was simply taken for granted. No charts or diagrams were used in the lesson. It was verbal from beginning to end. It is entirely possible that if a student from this class had been asked at the end of the hour to tell just what is meant by "ventral ganglia," he would have begun with the too familiar "It's something about—" or "It is when—."

Teaching in generalities is common. Some teachers simply do not know how to illustrate or clarify meaning, and some appear to believe that to do

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[2]Billett, Roy O., *Fundamentals of Secondary-School Teaching*, p. 141, Houghton Mifflin Company, 1940.

[3]*Ibid.*, p. 143.

so is juvenile and unacademic. Must the pupil be mystified to inspire respect for teacher and subject? Apt and meaningful examples and illustrations should be generously used. The material as presented in most textbooks needs such supplementation. Correct-thinking, to reiterate, must be built upon definite knowledge, clear concepts. Several instances have been reported of how badly pupils garble the Pledge to the Flag or the Lord's Prayer when asked to write it down and to discuss the real meaning of the various words and phrases. They mouth the words every day, but the words have little real significance. Another interesting illustration of the usual garbling of ideas and words is furnished by a popular song; what the child intended to say was, "Mares eat oats and does eat oats and little lambs eat ivy," but it came out in this fashion, "Mairzy doats and dozy doats and liddle lambzy divey." Imagine the perplexed expression on the face of the teacher who was told by one of her pupils that his favorite poem was about the girl who swallowed the ribbon. It developed that the pupil was referring to *The Night Before Christmas*, in particular the lines:

> Away to the window I flew like a flash,
> Tore open the shutters and threw up the sash.

Terminology is often a hindrance to understanding for many pupils. The commonest of teaching platitudes, "study this carefully" or "you haven't studied your lesson" is of no avail. The problem is not one of more time to be spent, more reading to be done, or more homework, but one of perceptual experiencing leading to concept formations. Someone has said that "the verbal cram is worse than worthless, it is injurious."

The concepts taught in school are sometimes not recognized outside the classroom. The classic example is the one of the pupils of a certain school in the Appalachian Highlands who had been studying the Appalachian Range, knew locations and map studies perfectly, but who confessed to the visiting educator that they had never seen the Appalachian Mountains. Another case may be cited of the youngster who had been studying Lake Erie at school, had even worked it out on a sand table, but who remarked the following summer when the family drove up to Lake Erie, "It wasn't like this at school." The Atlantic Ocean must have more meaning than a blue area on a map. The abstract study of parallel lines in geometry must in some way be tied up with the parallelism of the planks

of the floor, railroad tracks and ties, corn rows, streets, bookshelves, and all incidents of parallelism wherever found.

Laboratory work ordinarily clears up many misinterpretations and misconceptions. Home-economics students, for example, are not baffled by their work; their laboratory is a place for "working out" otherwise baffling problems. Perceptual foundations and experiences are a definite part of the laboratory purpose. To see, to feel, to smell, to hear, to taste—to sense and then build into knowledge categories is the correct approach.

Verbalism is insidious. Fluent speech is acceptable coin for understanding in most classrooms. Is it too much to ask that teachers probe beneath the rules and principles so glibly quoted? It is easy enough for pupils to say that to divide a fraction by a fraction, one must invert and multiply. They can also be easily taught to apply this rule, but do they know why this is the rule? It is also easy to teach that the value of digits in a number increases from right to left in decimal ratio, but do the pupils know why this is so, or perhaps, do they have a clear meaning of such words as digit and decimal ratio? Pupils soon learn that the grade "pay-off" comes from giving back to the teacher the textbook statement. Yet teachers know that experiments in the psychological laboratory have shown conclusively that meaningful material is more easily learned than



The laboratory is a place for working out problems which otherwise might be baffling.

COURTESY OF HAWAII DEPARTMENT OF INSTRUCTION



COURTESY OF HAWAII DEPARTMENT OF INSTRUCTION

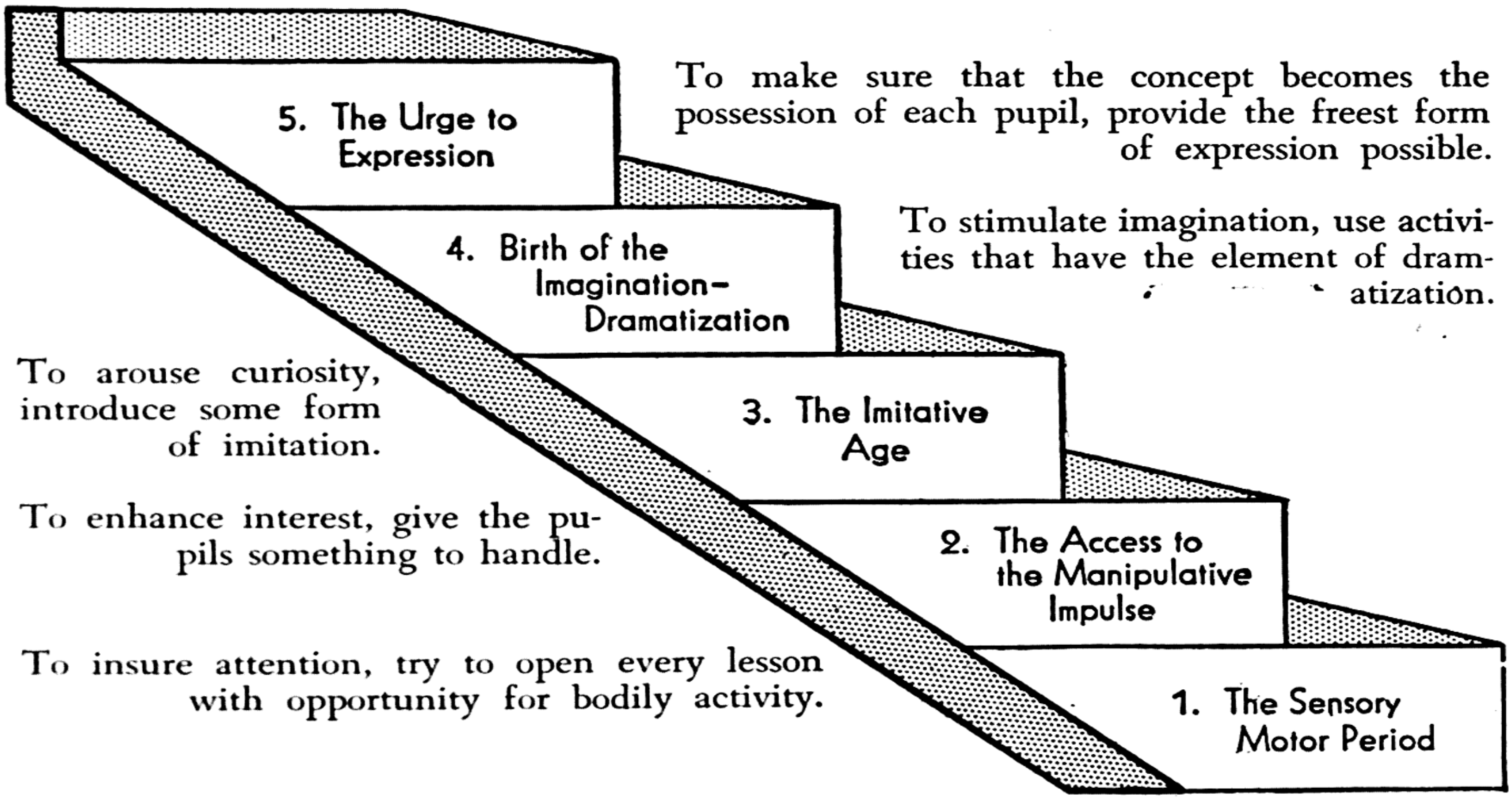
A first-grade group is beginning to turn a few word symbols into meaning. Note the opportunities for class understanding.

nonsense material, and that retention is greater. The curriculum of today is looked upon as experience. An atmosphere of reality has come into the modern classroom with an insistence that the work be functional. The work of the school must be related to the activities of life outside the classroom. Subjects are not sacrosanct; seldom are they ends in themselves. They are merely the tools used to enable children to solve their problems, to grow educationally.

Teaching Needs to be Pragmatic. It has not been the purpose of this discussion to maintain that a Royal Road to learning has been found. There are so many variables to be handled, individual differences in ability, interest, cultural backgrounds, attention, concrete and abstract mindedness, that teachers will necessarily have to apply the pragmatic test of the greatest good to the greatest number. Teaching, and learning, too, must be practical, functional; to be worth while it must serve its purpose. Direct learning is indispensable, but, as has been so often pointed out, there are circumstances under which vicarious experiencing must be substituted.

Throughout this discussion emphasis has been placed on the values of direct experiencing—accuracy of images, vividness of images, economy of

time in learning, permanence of retention, stimulation of interest, and cultivation of powers of observation. Teachers are often amazed at the knowledge of the pupil who has, for example, taken a trip through or spent a vacation in the Smoky Mountains. The child vitalizes the lesson for the whole class, because he has experienced directly and knows whereof he speaks. Such a child is likely to do more reading for the lesson assignment and to get more out of his reading than the other pupils.



The Five Natural Steps in the Child Learning Process. (From *Visual Education,* a monograph of the Department of Elementary School Principals, National Education Association.)

The opportunities for direct experiencing are multitudinous and several of the pupils of nearly every class have had wide and varied experiences. Of course, large numbers of the class have not had these advantages. Opportunities for travel and other forms of experiencing are not equal for all people. Must we, then, condemn the less fortunate to a dull reading of textbooks? Schools are attempting to provide opportunities for direct experiencing through field trips and school journeys, school gardens, shops, laboratories, dramatizations, mock political conventions and Congresses, school banking, motion pictures, radio in classwork, and other means. Not all of these activities are primarily direct experiencing; some are secondary. They are a step removed from the thing or event itself but they have, nevertheless, considerable perceptual value. Hoover Dam in

pictures is probably not as fruitful a source of experiencing as is a trip to the dam, but the experiences gained through a trip to the dam could be enriched by a series of good films. Invariably, people who have seen a particular area seem to enjoy pictures of the locality more than those who have not seen it first hand. Motion pictures will round out the experiences and provide a better pattern of total understanding.

The relationship between the psychological laws of learning and the use of audio-visual materials is clearly shown in the accompanying figure originally derived by the Department of Elementary Principals of the National Education Association.

What then is the role of the teacher in audio-visual education? It is to assist the school to achieve its educational objectives in the shortest amount of time, and with the greatest permanence. To do this, the teacher can, by the use of audio-visual materials, remove the confusion from learning which comes from a lack of rich experiential background and from inadequate concepts.

Principles Governing the Presentation and Use of A-V Materials. Throughout this book, guiding principles for the use of visual and auditory materials have been included. It is not enough that teachers know the value of the materials. They must know how to use them. Specific materials are discussed in the chapters which follow, and their uses are carefully shown. But in concluding this chapter on the role of the teacher, it seems appropriate to get an over-all picture of the principles which govern the entire field.

1. No one type of method or material should be used to the exclusion of others.
2. Certain materials seem more appropriate for certain units of understanding, or in connection with certain objectives, than others.
3. Too much material used at any one time may befog rather than clarify learning. Jaded mental appetites are worse than the "brassy taste" of a whetted appetite.
4. Preparation for the proper use of visual or other learning material must always be made.
5. The materials should be woven into lessons and teaching procedures, because they are integral parts of lessons.
6. The pupil must be prepared and handled as an active participant.
7. The pupil must be held responsible for what goes on during the

lesson. How best to do this cannot be laid down categorically. Some teachers may have pupils answer prepared study guides; demonstrations and field trips may be written up; film showings may be followed by compositions, library research, discussions, creative art work, or a score of other activities.

8. On the whole, examples, specimens, or demonstrations should be positive rather than negative. There is always some danger that the negative example will be mistaken for the positive.
9. The teacher should provide opportunities for language training, oral and written, to accompany perceptual experiencing.
10. Above all, never use materials haphazardly nor allow the lesson to become mere entertainment unless the lesson objective is just that and nothing more. There are times for recreation and entertainment, of course.
11. Materials of instruction, teaching procedures, laws of learning, and the objectives of education must be co-ordinated and integrated.

Attention to the guiding principles in the use of curriculum materials listed above will offset practically all the criticisms which have been made of the utilization of films, slides, stereographs, graphs, specimens, and other such materials. It cannot, however, be emphasized too strongly that the child's mental growth must lead into a development of the higher mental processes.

Some Practical Values of Perceptual Materials. At this point the reader may very well say, "This is all well and good, but it is academic and impractical." Therefore, let us sketch some of the practical values of audio-visual materials for every teacher.

They overcome the limitations of restricted personal experiences of pupils. Opportunities for rich personal experiencing are usually limited in both individuals and communities. Children of two families within a community may have most dissimilar backgrounds. One may have traveled, had books, music, tools, and rich home conversational experiences, whereas the other suffered from poverty in all these things. The same holds for communities. Audio-visual materials, more than other teaching media, tend to equalize this disparity in experiential background. If pupils cannot be taken to cultural places, then bring the cultural places to them.

They overcome the limitations of the walls of the classroom. It is indisputable that traditional methods of teaching often do not free children from the restrictions of the classroom. There are physical limitations which books, lectures, and explanations cannot surmount with any degree of satisfaction. For example, complete concepts of many kinds depend upon experience and information which are studied most indirectly. Many of the audio-visual aids provide for more meaningful experiences than those derivable from reading and lectures. These experiences are difficult to acquire because the student cannot come to grips with them. (1) They may be too big. Thus, a city is difficult to experience directly except as one lives with it for a long time. A trip to New York or San Francisco, although exceedingly valuable, still may leave much undone because the object being studied is "too big" to circumscribe in a relatively short period of time. Therefore, a good thirty-minute motion picture might conceivably do a better job. The story of a steel mill is similar. It would take a long time to experience firsthand the Gary Works or the Homestead Mills of the United States Steel Corporation. All visitors cannot be taken to view certain processes which are open to the photographer. Many people come away from their first trip to a steel mill completely confused. The picture is actually preferable in many ways. (2) Some objects, organisms or movements may be "too small" to be observable or manipulated. Protozoa and bacteria must be studied under magnification. Lantern slides and motion pictures are exceedingly beneficial in classes dealing with these subjects. (3) Other phenomena may be "too slow" to be seen and studied. Time-lapse photography shows the details of the germination of a seed or the opening of a bloom. (4) The opposite of this is equally true; some things are "too fast" to be seen. Bullets may be photographed in flight, the beat of the wings of the hummingbird are slowed down for careful study, or the foul committed in the football game is seen in full. (5) Other things may be "too complex." Witness the operation of the action in the chambers of the combustion engine or the electrical system of a giant bomber. Animated diagrams help simplify complex structures and phenomena. (6) Sounds are often "inaudible" to the unaided ear and must be amplified. (7) Finally, such restrictions as seasons, climate, altitude, and geography in general are overcome. These matters may be taught at any time and in any place. The storm atop the loftiest mountain and the plant and animal life on the bottom of the ocean are spread before

the student. It may be objected that all of the above considerations may be taught by books and explanations, but can they be taught quite so well and "learned for keeps" as through audio-visual media?

They provide for the direct interaction of the pupils with the realities of the social and physical environment. One of the greatest criticisms of the traditional classroom is its enervating effect on the pupils. Instead of constantly "reading about" or "talking about" social and physical phenomena, pupils need to come into direct contact with them in as many ways as possible. In addition to such printed and verbal materials as textbooks, supplementary books, periodicals, pamphlets, lectures, forums, and explanations, they need the wealth of material available through records, transcriptions, motion pictures, filmslides, stereographs, charts, maps, diagrams, experiments, demonstrations, trips to museums, factories, institutions, and a host of similar types of data. Thousands of children read and memorize facts about qualifications for justices, but never see the courts and justice being administered.

Olsen has suggested ten major approaches to the study of community life by the school. He speaks of each approach as a "bridge" between school and community. These "bridges" are:

Documentary Materials	Surveys
Audio-Visual Aids	Extended Field Study
Resource Visitors	Camping
Interviews	Service Projects
Field Trips	Work Experience[4]

They provide uniformity of percepts. What a person perceives depends partly upon the stimulus and partly upon the background of experiences which are used to provide meaning, the way the sensation is interpreted. Two children have very different perceptions of an orange if one merely sees it and the other both sees and handles it, or sees it growing on a tree. Audio-visual materials provide all the pupils with a common perceptual experience. A projected magnification of the eye of the house-fly or the scales from the wing of a butterfly enables every pupil to see clearly what the instructor wishes the class to see; but by individual magnification, some pupils may miss the essential points altogether. The teacher will never know for certain whether the pupil *actually saw*, because he will rely upon the pupil's statement that *he saw*.

[4]Olsen, E. G., *School and Community*, p. 73 ff. Copyright, 1945, by Prentice-Hall, Inc.

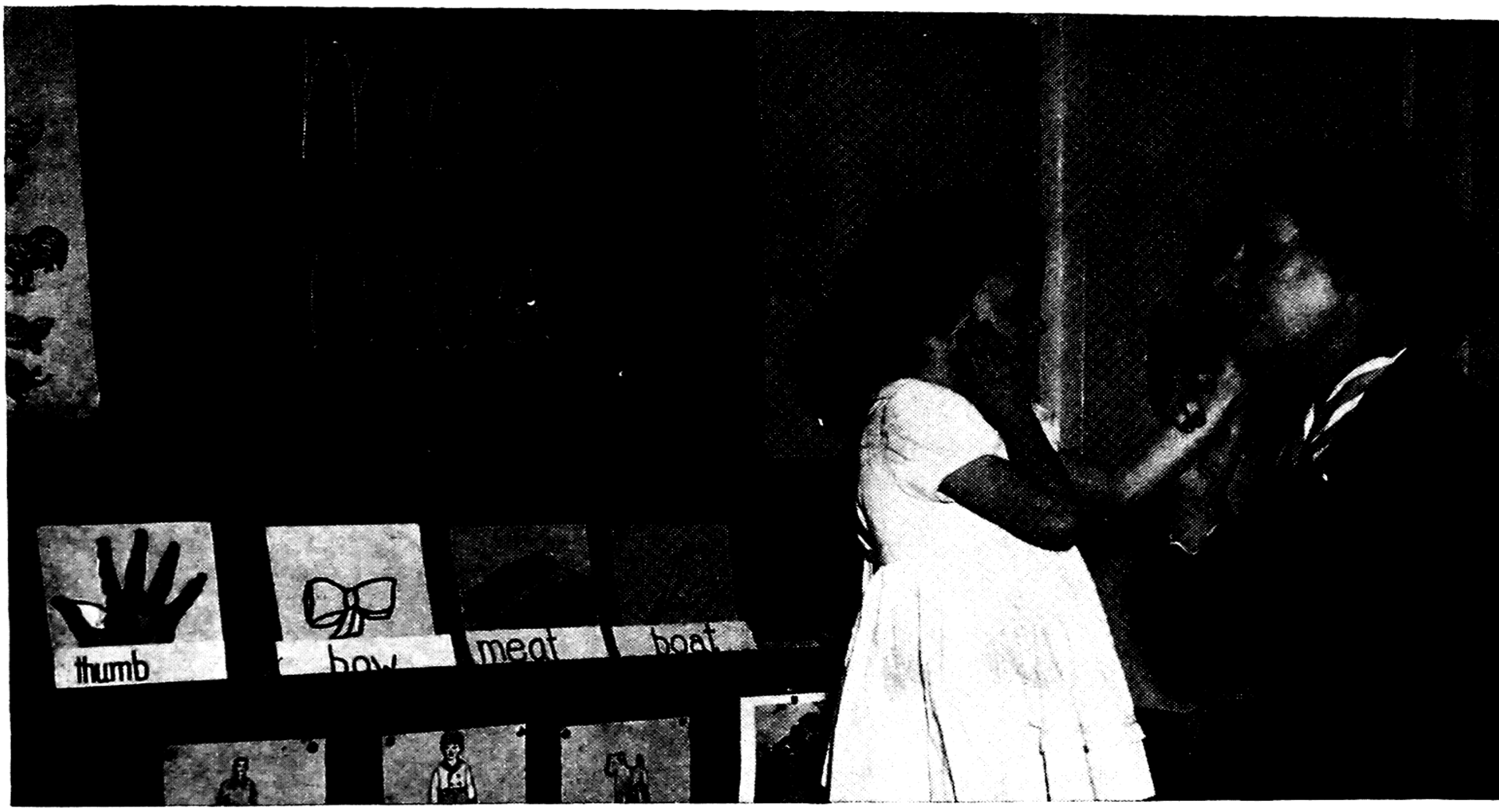
They give initial concepts which are correct, real, and complete. Learning things correctly initially is economical learning. Misinformation, haziness, errors of all kinds must be followed by diagnostic study and remedial treatment. This is wasteful. It is easier to learn initially the correct addition combinations, for example, than to learn them incorrectly and later have to make corrections. Often the teacher has difficulty in explaining a process or phenomenon, and different children get different conceptions. It is reported that one child had the idea that a cow was a small blue animal because it is so pictured on the label of a condensed milk can. Modes of living in faraway places or in a past age are egregiously misunderstood by too many people. Teach fully, completely, correctly, and realistically at the outset. Pictures, films, objects, models, graphs, trips, and similar instructional materials, are the best ways known for providing the enrichment of concepts which all intelligent teachers seek.

They awaken new desires and interests. As the pupils' experiences are broadened and enriched, as their perceptions are keener, as their concepts are more complete, they will inevitably respond with new desires, thoughts, attitudes, and interests. These will be translated into:

Reading	Creation
Thinking	Attitudes
Problem solving	Appreciations
Imagination	Skills

They provide motivation and stimulation. Visual instruction will undoubtedly motivate and stimulate learning of all types. The teacher who is about to begin a new unit of instruction wishes to provide the proper stimulation to provoke the class to maximum effort. A few well-selected pictures for the bulletin board may help, or a short reel of motion pictures, or a demonstration, or a phonograph record, or a timely radio broadcast. These aids will be equally effective to renew stimulation and motivation as the unit is being developed. Audio-visual materials have a salutary psychological effect.

They provide for economical learning. An old Chinese proverb contends that one picture is worth ten thousand words. Certainly seeing an object or a process will save much explanation and verbalization. Clearer and more intense images will result. Retention will be longer. A half-hour film dealing with the subject of heredity or the Panama Canal will save hours of time, furnish clearer concepts, provide more factual



COURTESY OF ATLANTA PUBLIC SCHOOLS

Visual aids are a necessity for children without the sense of hearing.

data, and make possible a longer retention of the facts and interpretations. With crowded curriculums and an ever-increasing body of knowledge which the pupil must in some way encompass, time is of the utmost importance. Even in such a matter as a review, a well-chosen, appropriate visual or auditory aid may save much repetition.

They provide integrated experiences which vary from concrete to abstract. Few, if any, teaching aids, materials, or techniques have the versatility of audio-visual materials. They run the entire gamut, thus providing for all variations in ability of learners and in type of experience from concrete to abstract. A good film on the Statue of Liberty will present concrete images as to appearance, size, location in the harbor, and similar information, but it may also lead to generalizations of the *meaning* of liberty, the universality of liberty for peoples, and other far-reaching abstractions.

Audio-visual teaching increases the possible educative growth of non-academic-minded pupils. The pupil of less-than-average intelligence will profit immeasurably from a wise use of audio-visual aids. He learns best through concrete approaches; he has difficulty with the abstractness of symbolism, and though not devoid of a capacity to conceptualize and generalize, he is limited in degree and rapidity. Direct and vicarious audio-visual methods are a boon to such pupils. This is not to say that only

the nonacademic-minded pupil profits from such materials and methods.

No one should fall into the error of believing that such materials are valuable only for younger children. College and university students profit highly from them. Such diversified subjects as electricity, nuclear chemistry, heredity, endocrinology, world economics, international co-operation, penology, housing, literature or planetary systems make, as they should, extensive use of audio-visual materials.

Some Practical Ways of Utilizing Perceptual Materials. Each audio-visual tool has its own specific utilization techniques. Each will be discussed specifically in subsequent chapters. Experience and research provide the following general principles which apply to all the materials.

1. They should be integrated with the curriculum—be it one of experience or subject-matter type.
2. They should be previewed or tried out in advance of use in classroom.
3. They should be *taught,* not merely shown.
4. Provision should be made for definite follow-ups.
5. Records should be kept of results obtained; evaluations should be made.
6. Too many aids should not be used at one time.
7. The type of materials used should enrich the experience being taught.
8. They should be used in the regular classroom or laboratory.
9. They should supplement, not supplant the teacher, textbook, and other materials.
10. They should be available when and where needed.
11. They should be factually and technically correct.
12. No one type of material is best for all learning situations; each has a specific role in order to provide maximum effectiveness.

Chief Limitations to Greater Use of Perceptual Materials. There are a number of factors which militate against a more significant and extended use of the media of instruction under discussion. Some of the friends of audio-visual education have been overenthusiastic and have made exaggerated claims for it. Too much zeal has killed or handicapped other excellent ideas. There is need for keen analysis, critical thought, and controlled research.

Many of the limitations which have dogged audio-visual development have been overcome. There have been misconceptions and misunderstandings almost without end. There have been those teachers and administrators who wanted to get on the band wagon because the idea seemed progressive, which is certainly not a new phenomenon. Again, teachers have been found using audio-visual materials as an anodyne for boisterous or indifferent pupils; hardly a worthy use in and of itself. Using audio-visual materials must not be associated with entertainment and recreation. Merely exposing children to a few prints, slides, or motion pictures does not guarantee an education.

Motion pictures are still regarded as a luxury and a frill by a great many parents and taxpayers. Most of the research, convincing as it is, has not sifted down to the layman. Books and articles are written for the profession, and laymen see little of them. Even the rank and file of teachers have little understanding of the values, objectives, and methods involved.

The lack of trained and enthusiastic teachers for this work is appalling. Someone has estimated that only twenty-five thousand of the million or so American teachers have had adequate training in the use of sensory materials, but progress is being made in the training of new teachers. Many of the teachers who are using audio-visual aids are using them indiscriminately and without proper integration with the learning experiences of the pupils.

Another limitation to development has been the inadequacy of these aids in both variety and number. The extent of utilization of these materials is roughly proportional to the size of the school districts. Larger and urban schools provide relatively and actually many more audio-visual materials than smaller schools.

There is also another type of inadequacy, that is, inadequacy of performance of some of the equipment. Good projection for lantern slides, opaque and micro-projection, and motion pictures in many classrooms has been a problem. Better equipment has overcome these problems to the point where one is safe in saying that they are no longer a necessary limitation or cause for excuse.

Tied up with inadequacy in amount of equipment is the matter of costs. Some of the materials, for example, motion-picture films, projectors, lanterns, radios, phonographs, and extended field trips, appear to untrained lay school boards as the epitome of extravagance. To them,

paper, pencils, ink, maps, and books are all well and good for the school. These are traditional and inexpensive. Many of these individuals fail to realize that society of today has moved out into new areas on every front. Materials and equipment in every walk of life have changed, be they those of the farm, city, factory, army, navy, home, or school.

It should also be remembered that many more pupils can be taught at one time with proper visual equipment and in many cases the learning time can be shortened considerably. Sorely needed time may therefore be saved and spent in individual teaching. Tests show that efficiency can be increased from 5 to 50 per cent with audio-visual materials. Another aspect of economy is evident if one considers that a library book is expected to serve about twenty borrowers before it has to be rebound; it then serves about forty before it is worn out and ready to be discarded. At the Chicago World's Fair some reels of motion pictures were shown fifteen hundred times before they were discarded. Literally hundreds of thousands "read" the pictorial story of these films. A Circulation Report for Visual Aids for the city of Cleveland shows that:

> . . . 120 Cleveland Elementary and High Schools, from September through June, booked a total of 24,488 films—12,549 silent and 11,939 sound—consisting of 1,007 silent subjects and 1,070 sound subjects. This represented an average of 144 films circulated daily and an average of 204 films booked and circulated to each of the 120 schools. Based on an average of four showings per week per film to different class groups, and forty pupils at each showing, the school film audience totalled 3,918,080 pupils.
>
> It is estimated that the total cost per pupil per showing of a silent film is ⅜ cent, and ¾ cent per pupil for a sound film.[5]

Although school boards have talked much about financial economy, they have thought little about instructional economy. How many can see that the expenditure of a few dollars for better equipment can mean increased effectiveness in teaching, motivated learning, enriched experiences, and even reduction in pupil retardation? With audio-visual materials permanence of learning will be demonstrably increased. Better citizenship will be fostered. It is not claiming too much to say that juvenile delinquency can be reduced. Schools which are showing noonday motion pictures report better school attendance, fewer tardies, and

[5] "Cleveland Survey of Visual Aids Circulated," *Educational Screen*, 23: 442, December, 1944.

fewer school misdemeanors.[6] Greater efficiency and greater economy are inexorably linked together. This is a prime fact and must not be lost from sight.

In connection with the motion picture, at least, there has been difficulty in the production and distribution of suitable teaching films. But now suitable pictures are being made by many agencies, and state departments of education and universities are helping make them available to schools.

Most of the courses of study now in use in schools devote little or no time to the utilization of audio-visual materials. Revisions will overcome this, and even without revisions, properly prepared teachers will know when and what materials to use. One of the hopeful discernible trends is in connection with what is now considered the proper qualifications for a city school director of visualization. He must be acquainted with curriculum materials and understand the proper relationship of all materials to teaching and course construction. This qualification has been operative in recent appointments and promotions in New York, Los Angeles, and Cleveland.

Some of the newer textbooks list appropriate visual materials along with bibliographies at the close of chapters. And in this same connection one of the large textbook publishing houses has produced a series of twenty-four text-films and twenty-two filmstrips to accompany several of its leading textbooks. Another company has gone through its physical science

[6]This is not a contradiction of the statement that visual aids should be used in the classroom. Noonday movies are intended for recreation and should not be confused with the school's instructional program.



Correlated learning materials enrich the curriculum.

PCW FILM SERVICE

textbooks and arranged complete visual materials. One company has a filmstrip program for geometry. Still another company is interested in records. And the story goes on. This all boils down to the fact that utilization-centered materials are now being produced.

Some teachers and psychologists have frowned on an extensive use of visual-sensory aids. For example, it has been said that audio-visual aids stress partial learning situations instead of stimulating pupils to react to whole situations. Do these new aids violate whole learning? Are they more piecemeal than some of the more traditional teaching techniques? Any serious student of the problem will question these objections. In fact, the very opposite thesis can be defended. Other objectors say visual aids dull perception and imagination, that they result in teaching down rather than up in respect to intelligence. There is so much positive evidence to the contrary that these criticisms have little value other than stimulating scientific research and analysis to prove their incorrectness.

Lastly, there is the claim that the radio and motion picture cannot be kept strictly free from propaganda and prejudice. The possibility of this claim is admitted to the extent that vigilance is imperative. Yet teachers, principals, superintendents, parent-teacher organizations, and other friends of education who have heard some of the educational broadcasts and have seen some of the instructional films fail to discern cause for worry. Then, too, it might appropriately be added, that the school is not a sterilized environment separated from society; it is a very real part of society. Is not the school the most logical place for youth to learn how to differentiate between fact and propaganda? Thus, what appears to some as a liability might in fact be an asset.

Herbert Spencer is said to have made the statement that that man is best educated who has touched life in most places. John Stuart Mill included in education "everything that helps to shape a human being." This is chiefly direct experiencing. Educational reformers and great educational movements have stressed it, and it is heartening to see the stress which is being put upon the experience theory of learning. A recent editorial in a magazine summarizes this new concept of education very nicely:

> Since all learning derives from sensory experience which is predominantly audio-visual, our so-called audio-visual education is the fundamental basis for all educational progress. Strangely enough, up to the present century, the audio-visual senses have served education best in the pre-school and post

school periods. Schoolrooms were used to shut out the world, eclipse the vision, and bury young minds in books and words. Only with the twentieth century have schools begun to correct this disparity and enrich their procedures through a wider use of the senses. The schools are now busily on their way to greater things.[7]

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. How does a child learn the meanings of the following: (a) penny, (b) lake, (c) dynamo, (d) kumquat, (e) crime, (f) social security?
2. Give and explain an example of learning not based upon perceptual experience.
3. Is there any limit to the growth of a concept?
4. What is the connection between "creative education" and perceptual experiencing?
5. Show the relative importance of concrete imagery to kindergarten, elementary-school, high-school, and college students.
6. Discuss the relative efficiency of visual and word imagery for pupils of different mental abilities.
7. Is verbalism likely to be greater in rural or urban schools? Is the analysis of the problem of verbalism the same for both types of schools? What effect might the consolidation of small school units have upon the use of visual-auditory aids?
8. Give examples of incorrect images held by pupils which can easily be corrected by visual aids. Analyze a few of the "boners" which are currently making the rounds.
9. How would you teach Whittier's "Snowbound" to a group of pupils in Key West, Florida?

LABORATORY EXERCISES

1. Screen the film *What Is Four?* (produced by Young America Films, 18 East 41st Street, New York 17, 15 minutes, 16-mm., sound, black and white or color). Discuss its use of the psychological principles discussed in this chapter. How many separate approaches to the generalization of *four* does it use? Should such symbols as +, —, and = be introduced at this time? Is the approach to the number concept used in this film the basic approach for concepts in other areas of learning? Is this primarily a curriculum film to be used in teaching arithmetic in the primary grades, or is it a film for teachers?
2. Screen *Our Shrinking World* (Young America Films, 18 East 41st Street, New York 17, 12 minutes, 16-mm., sound, black and white). Discuss it in much the same way proposed for *What Is Four.*
3. Screen *Democracy* (Encyclopedia Britannica Films, Inc., Wilmette, Ill., 11 minutes, 16-mm., sound, black and white). Handle as suggested above.
4. Screen the film *Who Will Teach Your Child* (McGraw-Hill Book Company, Text-Film Dept., 330 W. 42nd Street, New York 18, N. Y., 24 min-

[7] Greene, Nelson L., "Education Unlimited," *Educational Screen*, 24: 99, March, 1945.

utes, 16-mm., sound, black and white). In what ways does this film corroborate or negate the philosophy set forth in this chapter? Make special commentary concerning the sequences in the film which deal with the use of the motion picture in teaching.

5. Screen the film *Children Learning by Experience* (United World Films, Inc., 445 Park Avenue, New York 22, N. Y., 40 minutes, 16-mm., sound, black and white). This film shows that all children want to learn; enjoy practicing simple skills; strive constantly to understand the world around them; learn some things at second-hand but a great many more at play and through self-teaching. This film applies educational psychology to childhood. It is basic to the principles of this chapter.

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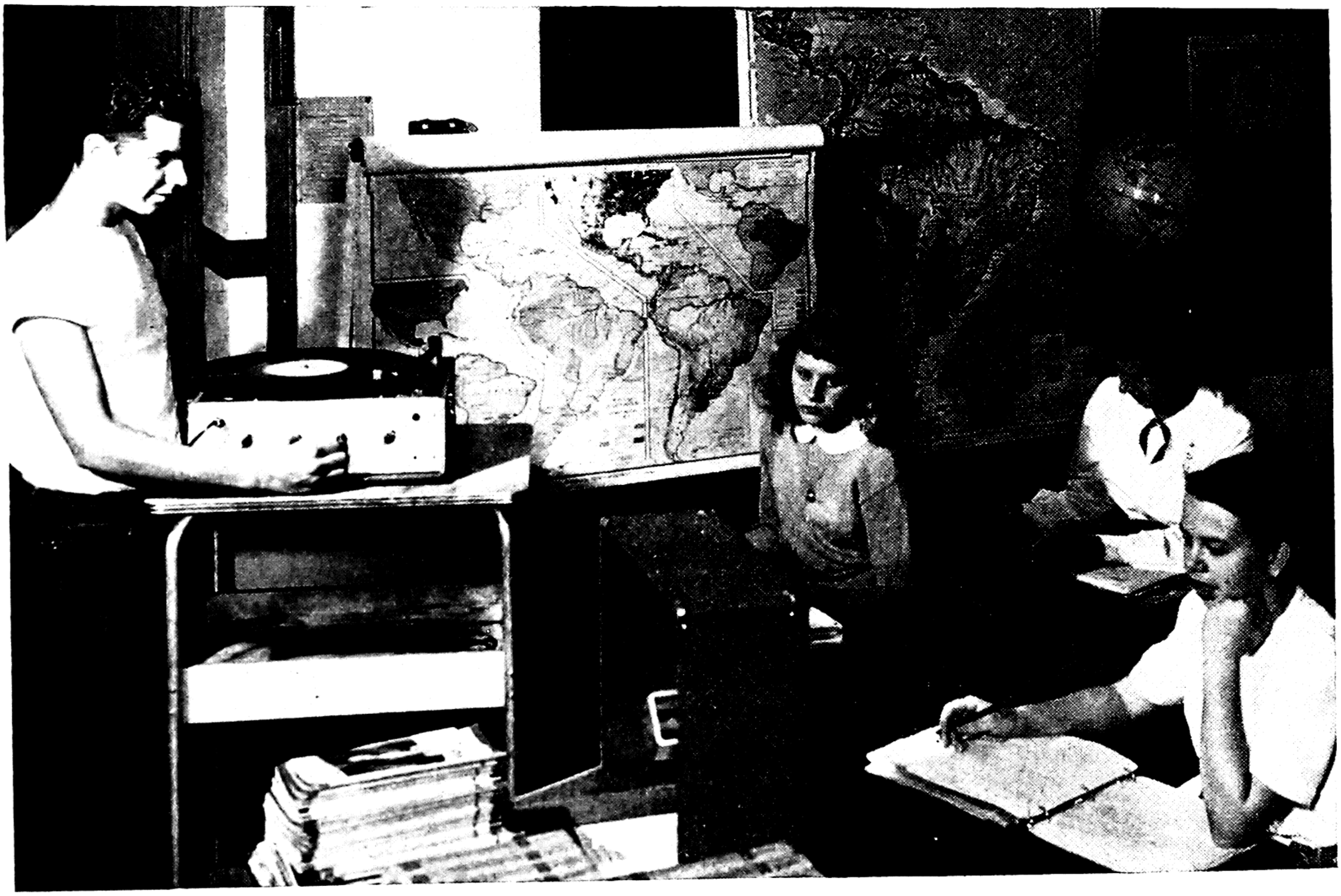
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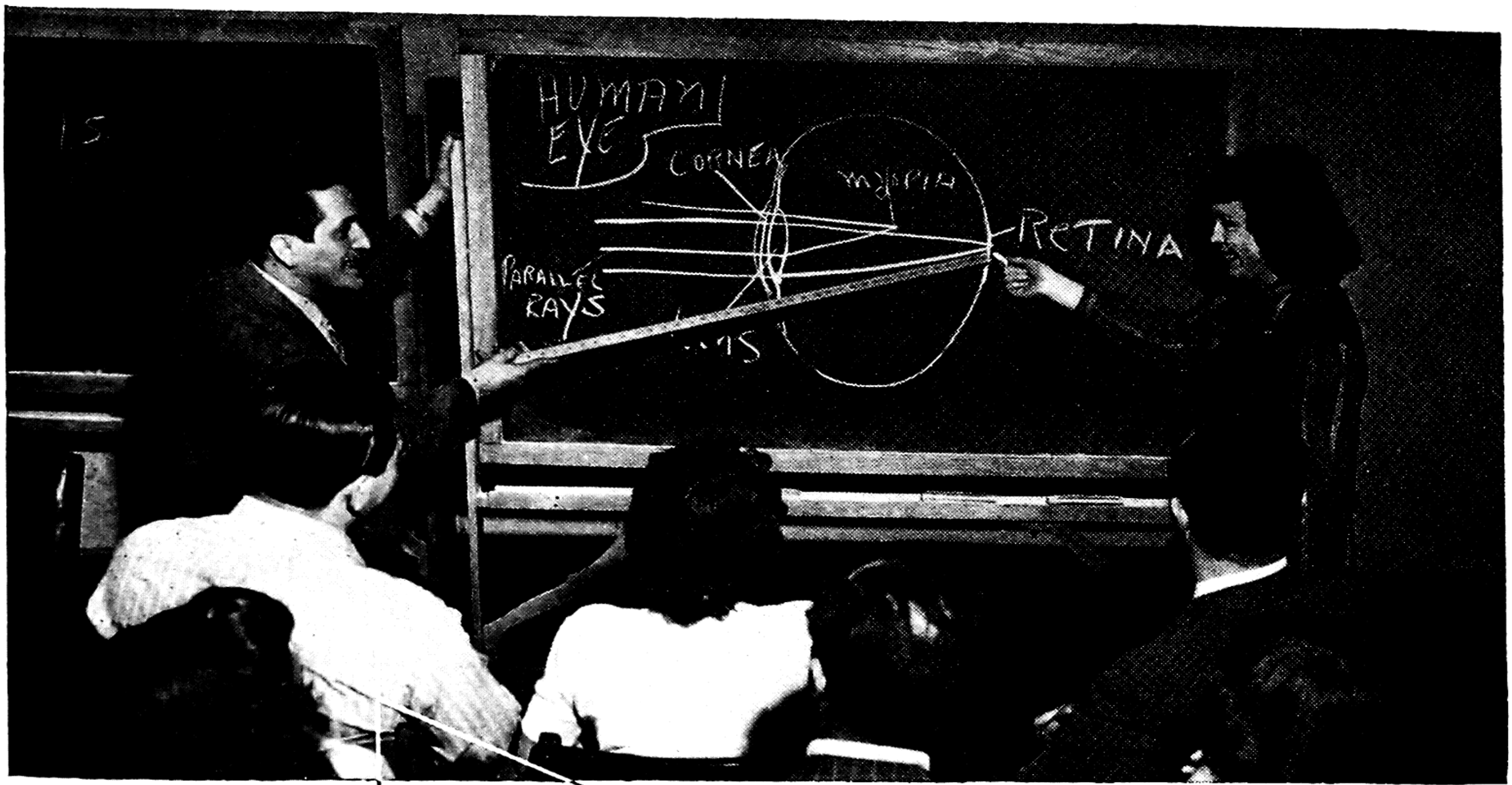
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Part TWO



VISUAL MATERIALS AND TECHNIQUES

Customarily people have come to think of all visual materials as something new on the educational horizon—a habit which may be attributed to the dominance in the field of some of the newer media. The materials presented in Part Two are varied—some are new and some are old. They range from the blackboard and the specimen to the motion picture and the microfilm. All are important, and each has a specific function to perform in a well-rounded visual program. Whether old or new they are valuable to teachers and students only if they fit modern educational aims and methods. Like all learning materials, they should be utilized by teachers and students working co-operatively to solve the problems faced by the members of the group. Part Two is organized under the following chapter headings:



Chapter 5

MULTIPLE-FUNCTION OR REPETITIVE TYPE VISUAL MATERIALS

The visual materials dealt with in this chapter are sometimes overlooked in visual education courses, not because these tools are unimportant but because they are common and more or less taken for granted. Blackboards, bulletin boards, and duplicating devices have considerable similarity. They are mechanical to a large extent, their functions are many, and they serve over and over again throughout the year. Materials are displayed, removed, and other materials take their places; they are relatively inexpensive. Teachers sometimes complain that money and equipment are not available to do some of the things which they would like to do. The purpose of including much of the material found in this chapter is to emphasize the fact that there are excellent learning materials all about us and that we should recognize their educative value and develop efficient ways of using them. Jonathan Daniels tells a story of a book agent who tried to sell an Arkansas farmer a set of scientific agricultural

books. The farmer didn't want them. The agent said he should buy them, because then he would be able to farm twice as well as at present. The farmer shook his head and replied, "I don't farm half as good as I know how now."[1] This is true of teachers, likewise; in fact it is nearly a universal.

THE BLACKBOARD (CHALKBOARD)

Some schools do not have motion-picture projectors; some do not even have still-picture projectors; but rare is the school that does not have a blackboard. Today, blackboards are as much a part of the school equipment as desks for the teacher and the pupils. Blackboards being so commonplace, their importance is frequently overlooked, especially in discussions of visual materials.

Historical Sketch. It is not known definitely when blackboards were first used. It is thought that they are a modification of the waxen tablets of the Romans and the hornbooks of the Middle Ages. A thirteenth-century manuscript by Sacrobosco has in it an illustration of a child holding up a large board shaped like a hornbook with figures on it. Numerous early manuscripts contain illustrations of boards hung on the walls of a schoolroom, and on these boards are figures, bits of the catechism, and musical notes. These boards appear to be modified hornbooks in shape, but very much larger than any board which could be conveniently held in the hand. A schoolbook published in 1497 in Basle shows a large wall-board as the title-page illustration.

The first edition of Comenius' illustrated book *Orbis Pictus*, published in 1658, shows a schoolroom on the wall of which there hangs a blackboard. From this it can be assumed that the blackboard, if not a customary thing, was at least not an unusual device. Similar evidence is found in Brinsley's *Ludus Literarius* published in 1660.

The blackboard does not occur in American educational literature before 1820, although it may have been used earlier. Professor Claude Crozet was using the blackboard at West Point Military Academy around 1830. Horace Mann urged the use of the blackboard following his observations of European schools and classroom methods. He emphasized its value as an instrument of instruction in his writings in the *Common*

[1]Daniels, Jonathan, *A Southerner Discovers the South*, pp. 163–64. Copyright, 1938, by The Macmillan Company.

School Journal. It is reported that an instructor by the name of Smythe used a blackboard at Bowdoin College in 1824. The blackboard was introduced with the sophomore algebra classes. It met with so much success that juniors who had already taken algebra requested the privilege of repeating it so that they might use this new method. Instructor Smythe was so successful that at the end of a year he was elevated to the position of assistant professor. The Report of the School Committee of Boston in 1823 recommended the use of the blackboard, especially in the mathematical branches.

William A. Alcott's famous prize essay presented to the American Institute of Instruction in 1831 offered a floor plan of an ideal school. In illustrating the furniture of the school, the author placed two movable blackboards just back of the rear row of seats.

Henry Barnard, like Horace Mann, urged the installation of blackboards. In his *First Annual Report* to the School Commissioners of Connecticut, he wrote, "Blackboards are not uncommon, but are little resorted to by the teacher."

Construction and Materials. Down through the ages various types of materials have been used in blackboard construction. The most commonly used material has been wood painted or stained black. This is the cheapest construction. Slate has also been quite commonly used in this country since the turn of the last century. It is an excellent graphic medium but its expensiveness and the difficulty of getting sheets sufficiently large and properly set have prevented its more extensive use. Composition board of various types has also been used. Cement mixtures containing black pigment have been tried. This form was not satisfactory, because it absorbed moisture and consequently the chalk did not mark evenly or easily and erasure was difficult. Recently experiments have been conducted with etched plate glass into which a black or other colored pigment has been introduced.

The color of the blackboard is usually a dull black or slate gray. Sporadic use has been made of a white surface on which a black crayon was used. Recently the National Institute of Industrial-Psychology has found evidence to the effect that a blue chalk on a yellow board lessens eye strain of pupils and adds to the general cheerfulness of the classroom. It is claimed that learning can be increased ten per cent by the use of the blue and yellow board. This is supposed to be owing to the lessened eye

strain. A part of the increased learning may conceivably be owing to the greater cheerfulness of the classroom.

This modern use of color for the so-called blackboard has given rise to a new term, the chalkboard. By using this term, confusion of color is eliminated.

A recent appearance on the market is a processed Masonite pressboard coated with a durable finish that is glossy-smooth and which withstands temperature and atmospheric changes. Various colors are possible. To accompany this board is a new composition crayon, which is advertised as one which will not crumble, nor break when dropped, can be easily erased, and does not stain. It is claimed that this combination of board and crayon offers great versatility, elimination of dust, and the greater visibility of "dark" writing or drawing against a light background.

One fourth of the children in school today have defective vision. Causes for this are manifold, and no school desires to contribute further to this serious situation. Any type of blackboard or crayon which will lessen glare or relieve eyestrain is worth primary consideration.

Blackboards should be constructed with the pupils who are to use them in mind. Standing on tiptoe to reach the board or having boards high above the eye level of the pupils is obviously unsatisfactory. Occasionally one finds in primary classrooms wooden steps placed on the floor below the blackboard so that the children can get up to the height of the board. This is, at best, a miserable makeshift. Boards in primary rooms should be 28 inches from the floor; intermediate grades, 32 inches; upper grades and high school, 36 inches.

Purposes Which Blackboards Serve. Blackboards came into use at a time when modern duplicating devices were unknown. Through the use of the blackboard the teacher could reproduce materials which an entire class could view at one time. Later the material could be erased and new material placed on the board. No expense was involved except for the original cost and insignificant sums for chalk. Pupils could also reproduce material for the teacher and other members of the class. Briefly, then, the purposes served are:

1. Reproduction of original material or material not found in class texts, such material to be used for immediate discussion or consideration
2. Elimination of lengthy dictation to pupils and of all the errors likely to creep into dictation exercises



COURTESY OF HAWAII DEPARTMENT OF INSTRUCTION

An ingenious use of the blackboard illustrates the shape of the mouth for making different sounds.

3. Presentation of new words, dates, terms, facts, principles, outlines, etc.
4. Illustration for purposes of clarification—diagrams, sketches, maps, graphs, etc.
5. Assignments to pupils, taking the place of verbal or dictated assignments involving study questions, exercises, problems, etc.
6. To display examination or test questions so that they can be seen by all the members of the class
7. To provide a place for pupils to do written work so that all the class can view the work at one time
8. To provide pupil recreation and relaxation
9. To provide space for decorative and creative work
10. To provide opportunities for varied presentation and motivation
11. To serve as a bulletin board for announcements, directions, programs, new regulations, etc.
12. To record honor rolls, prizes, etc.
13. To provide a medium for pupils to use in giving reports and demonstrations so that such reports are more vital and graphic
14. To serve as a screen for the projection of still pictures—but though maps or diagrams may be traced on the board from the projected image, as a screen *per se*, it is a poor makeshift

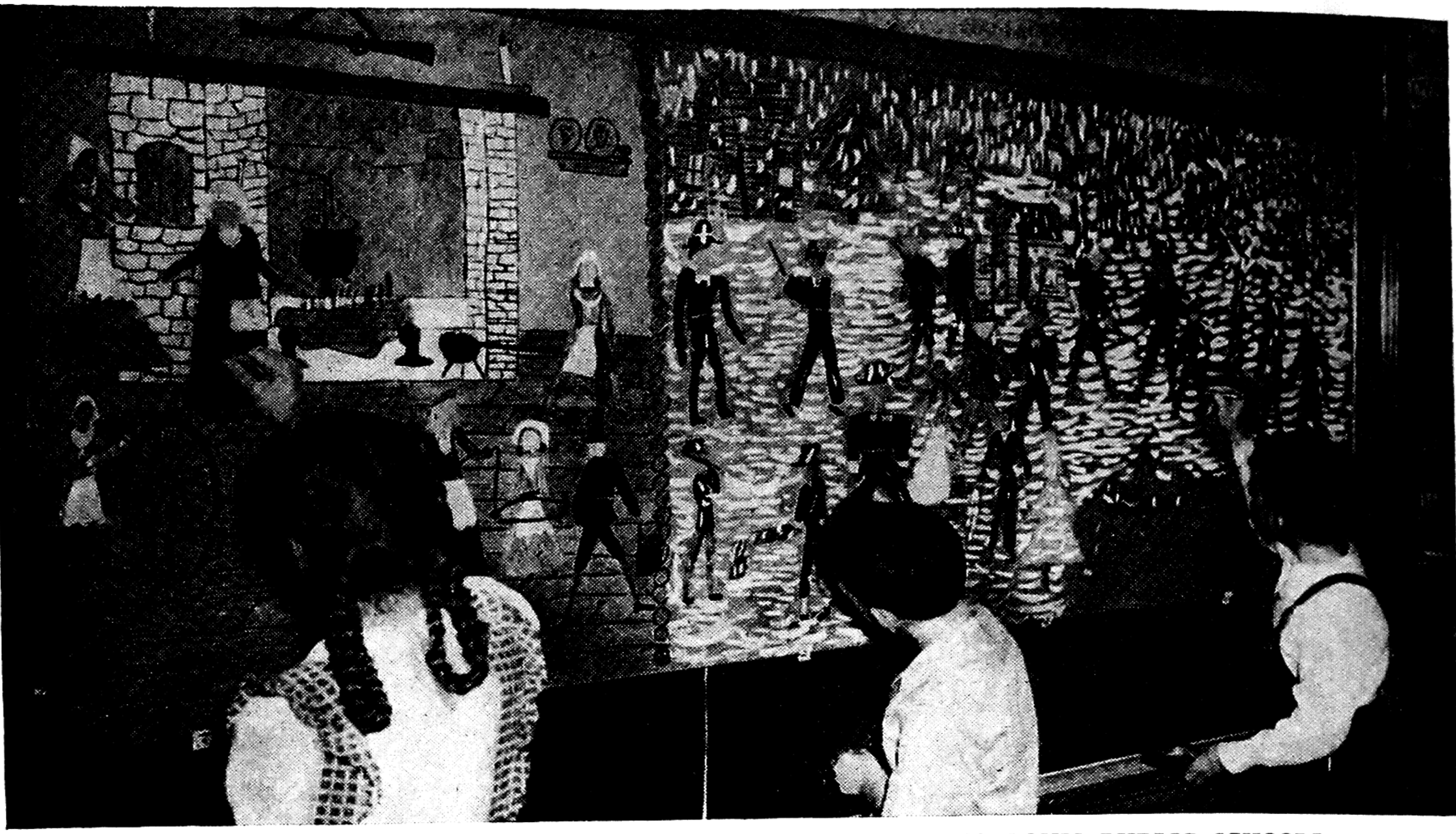
In 1935, R. E. Fildes, of the Hay-Edwards School of Springfield, Illinois, made an exhaustive study of the specific utilization of the blackboard by teachers. After listing the uses which teachers make of the

board, Mr. Fildes drew the following conclusions: (1) When teachers have access to simple and inexpensive duplicating devices, they use blackboards less extensively than when no such devices are available. (2) In approximately half the classrooms studied, large portions of the blackboard space were used only occasionally. (3) The desirability of using the blackboard for assigned work, except for short lists of questions, problems, or exercises may be questioned. (4) With the possible exception of short tests, means more effective than the blackboard may be found for the presentation of examination questions. (5) The practice of sending pupils to the board to work is, for the most part, a wasteful procedure. (6) Use of the blackboard is an effective method of presenting important facts and principles, such as new words, news items, rules, definitions, brief summaries, and rough outlines. (7) The quality of instruction may be improved in many instances by utilizing the blackboard for the purpose of illustrating important and difficult points. Graphic illustrations, especially sketch drawings, afford an effective method of clarifying obscure points.[2]

With many teachers, the chalkboard has really come into its own. There are perhaps few high-school subjects in which the blackboard plays a more important role than bookkeeping. Because of the great demand for constant repetition of such business forms as the balance sheet, the journal, the ledger, and the work sheet, some teachers have sections of the blackboard scored with a sharp instrument or painted in fine lines for form use. It is wasteful to take time out during class periods to draw forms which are used repeatedly. With these forms permanently on the board, entries may be easily and quickly made. The use of colored chalk to denote different kinds of entries will add to the effectiveness. Aside from setting up correct entries, arithmetical calculations can be verified in sight of all pupils and they are enabled to see corrections of errors. In the teaching of shorthand the blackboard may be used even more than in bookkeeping but the types of uses are limited. The chief function, of course, is to show correct shorthand characters for brief forms, individual words, sentences, and phrases. For those who are not acquainted with shorthand, it should be understood that movement or direction of strokes is important. Consequently, the teacher is able with the use of the board to illustrate and at the same time call attention to these important points.

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[2]Fildes, R. E., "Blackboards and Their Uses," *Elementary School Journal,* 35: 760, June, 1935.



COURTESY OF ST. LOUIS PUBLIC SCHOOLS

"Life in Colonial Times" is the theme of this blackboard mural. Originality and creative ability find expression here.

The blackboard may also be used to explain the origin of the shorthand alphabet, to illustrate new principles, to demonstrate the writing of phrases, and to explain to the students how they are to prepare their transcriptions. Diagrams of typed letters may be placed on the board as a guide for transcribing letters that are dictated. Blackboard shorthand is not always easy and the teacher must be careful. Here again colored chalk can be used to call attention to new words or combinations of sounds.

Other subjects which may make extensive use of the chalkboard and use permanent rulings or drawings are music, geography, and engineering. Rooms devoted to music can advantageously use a permanent scoring of the staff and lines. In geography outline maps showing longitudinal and latitudinal lines are helpful. Classes in mathematics and engineering use cross-section rulings so often that a section of the chalkboard might well be arranged for this purpose.

Limitations of the Blackboard. In spite of the universal use of the blackboard, it is not without its limitations; many of these can be eliminated by proper care and use. The limitations are:

1. Pupils have to turn in their seats to see material at side and rear wall boards.
2. Writing is often not visible from all parts of the room.
3. Time is wasted by the class in passing to the board and doing the work on it.
4. Dropping of erasers and crayons is noisy.
5. Incorrectness and errors may be stamped in the neurological processes of the pupils through seeing misspelled words, poor penmanship, or inadequate representations.
6. Pupils and teachers demonstrating at blackboards frequently obscure the very thing illustrated by standing in front of it.
7. Dust from chalk may cause throat and skin irritations.

Care of Blackboards. In the first place, the blackboards should be of good quality, free of defects and blemishes. There should never be a glare which a single pupil would face. Adjusting shades or turning the lights on or off may solve glare difficulties. Dustless white crayons for black boards or blue for yellow boards should be used for regular work. Other colored crayons should be available for special illustrations or correction of errors in pupils' work.

Blackboards should be cleaned each day. Trays and erasers should likewise be cleaned daily. If janitorial service is not adequate, other arrangements should be made. Housekeeping committees of pupils may be pressed into service. Chalk rails should not be cluttered up with a variety of objects. These rails are for chalk and erasers.

Other Considerations. Equipment companies and school architects are now planning chalkboards to serve several purposes other than those mentioned earlier. Boards are installed in movable and reversible panels. One side may well be a writing surface, the other a cork surface to be used as a bulletin board. Chalkboards which slide both horizontally and vertically and which tilt may have great utility for art work; in fact the tilted chalkboard may be used as an easel. White panels may be inserted for use as projection screens. It is also helpful to have sections which provide outline maps, music staffs, cross-section rulings, and similar conventionalized forms. If the chalkboard is fixed permanently, it is possible to paint such markings on the board with washable paints so that they can be cleared when they are no longer in constant use. Boards which move up and down in double hung sections make it possible to work at a con-

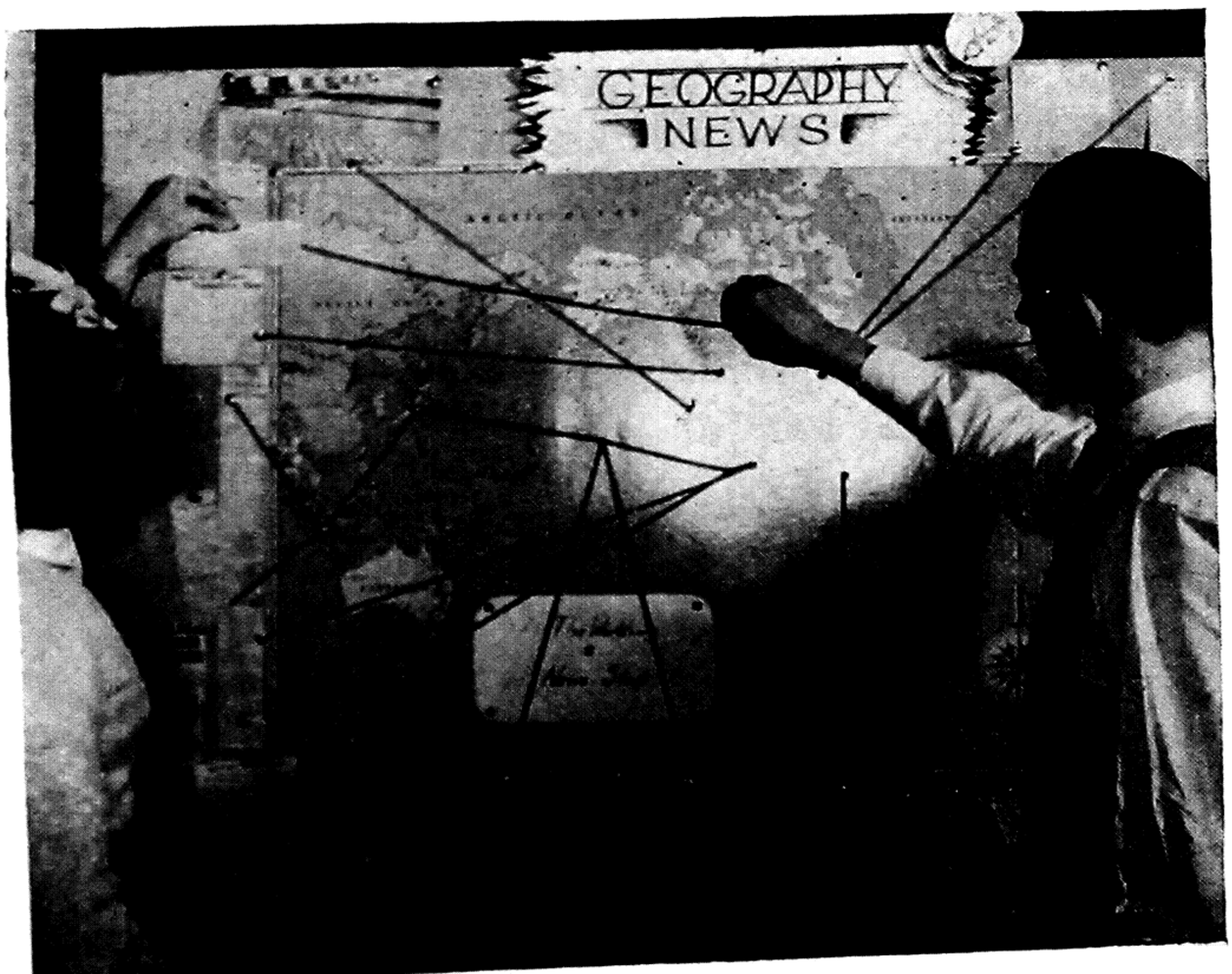
venient level and then to raise or lower the section for class study; also, to prepare material in advance of use and to cover it until it is needed. Sometimes shelves and cupboards are built in back of the movable chalkboards.

THE BULLETIN BOARD

Every classroom should be equipped with a suitable bulletin board. The bulletin board, properly used, not only serves as a display space for pupils' work, but is a source of much educative activity. Too little attention has been given to the bulletin board as a teaching aid, one which serves an educational purpose for all grades and subjects.

Variety of Values. The educative values of the bulletin board are practically obvious. Some of the more outstanding are:

1. Serves as a place for the proper display of outstanding work done by pupils
2. Provides a suitable place for the display of pertinent clippings, news, pictures, posters, photographs, and similar materials
3. Affords an appropriate place for posting announcements, assignments, honor rolls, and the like
4. Creates interest—it is not uncommon to see a knot of pupils around an interesting bulletin board before and after class
5. Unifies class spirit, feeling of ownership and responsibility
6. Acts as an agency for socialization through group effort in arranging displays and through care of the bulletin board



The bulletin board may be used to teach current events.

COURTESY OF DEPARTMENT OF LIBRARIES, VISUAL AIDS, AND RADIO, NEWARK, N. J., BOARD OF EDUCATION

7. Furnishes an outlet for artistic and creative ability of students
8. Helps to relieve the bareness and bleakness of many a classroom

Choosing a Location. Bulletin boards in classrooms should be in well-chosen places. Their location should rightfully be planned by the architect at the time the school is built. Usually the bulletin board is at the end of a blackboard. It should be in a well-lighted space and at a height corresponding to the eye level of the pupils.

Another type of bulletin board which serves the entire building is appropriately located in a front hall near the entrance. It bears the same relation to the school that the classroom board bears to the individual class or grade.

The Materials and Construction. Just as in the case of blackboards, many varieties of materials have been tried out for bulletin boards. Some of them are (a) cork, (b) linoleum, (c) soft wood, (d) composition board (celotex, beaver board, etc.), and (e) burlap. Any material will be rated as satisfactory if it is neat and is soft enough that thumb tacks may be pressed into it. It goes without saying that the material must be of a substance which will hold the tacks firmly. For this reason cardboard is unsatisfactory. Cork has been found to be the best of all materials, but it is the most expensive. Linoleum with its variety of colors is quite satisfactory. It can be cemented to the wall and will not buckle. Burlap is used chiefly in rooms which were not originally equipped with bulletin boards. Specimens must, of course, be pinned to it. Many schools might improve the appearance of their bulletin boards by having the manual training department furnish them with a light, inexpensive wooden border painted to harmonize with the setting.

Types, Care, and Utilization. The above discussion has been from the point of view of fixed or permanent bulletin boards. They may be movable, that is, they may be the reverse side of movable blackboards, as indicated earlier in the chapter. There are also folding and suspended boards. Some schools use a patented device of panels, each about 20 by 25 inches, and hinged to swing to right and left. The chief objections to this type are that only a part of the display is visible at a time, the stand may take up too much space, or it is relegated to an obscure corner of the room. In the general care and utilization of the bulletin board, attention to the following details is important.

1. Selection of material to be posted should be of general interest.
2. The board should be neatly arranged and artistic. Proper labels add to the general value.
3. It should be well-lighted (natural or artificial).
4. The material on the board should be correlated with the regular school activities. Attention should be directed to the various displays. It is not enough merely to arrange an artistic bulletin board; it should be used in the class discussions. A very excellent use of the bulletin board came to the author's attention recently. The class in question was making an elaborate study of the postal service. The outline of the project including all reading, construction, collections, and committee assignments was posted on the board. Below the outline of what was to be done was a series of progress reports and charts showing just how far the unit had progressed. The pupils of this classroom had used nearly every inch of available wall space for displaying tangible results of their project.
5. The bulletin board should be a feature of the school or classroom of which the pupils will be proud. Develop a feeling of ownership.
6. The class should assume responsibility for the bulletin board's care and for displays. Frequently this is done by committees.
7. The material on the bulletin board should be changed frequently. It must be timely. Some displays are valuable for a day, others for two days, a week, or perhaps longer.

This bulletin-board display is placed in the school library.

COURTESY OF ATLANTA PUBLIC SCHOOLS



Rating the Bulletin Board. The rating scale given below may very well be the basis for a teacher-class evaluation of the various bulletin board displays for the year. If student committees have been responsible for the displays, the entire class might rate the several exhibits at the time they are posted. Appropriate discussions are in order. A scheme such as this will improve the quality of the bulletin board product, provide socialization, and further a spirit of ownership.

I.	General Appearance	(50)	
	Arrangement	10	
	Variety of Materials	10	
	Appeal	5	
	Authentic Illustration	5	
	Neatness	5	
	Originality	5	
	Color Contrast	5	
	Explanations	2	
	Labels & Printing	3	
II.	Educational Value	(50)	
	Clearness of Purpose	10	
	Appropriateness	10	
	Timeliness	10	
	Stimulation	10	
	Comprehensiveness	10	
	Total	100	

Rating Scale for Bulletin Boards

DUPLICATING DEVICES

Duplicating devices are so vital a part of the equipment of the progressive school that they might well be classified as "aids to teachers regularly supplied by the school system." The production of concrete materials to be placed in the hands of the pupils to enrich and vitalize the learning experience comes logically within the scope of sensory and perceptual materials, and cannot be overlooked in a book of this type.

Producing a single copy at the time of a test, exercise, or what not, might be all right if the teacher were instructing only a single pupil; but with large numbers to instruct, labor-saving devices are a necessity. Duplicators had proved their worth in business before schools realized their efficiency. Today there is scarcely a school system, aside from rural schools, which does not have provisions for producing multiple copies

of tests, study guides, seat work, pictures, puzzles, posters, class bulletins, project specifications, general assignments, diagnostic and remedial assignments, book lists, shop and laboratory instructions, programs, and scores of other notices and materials. When such materials are produced by teachers for regular instructional purposes, the material is personal and timely. It is created with specific goals in mind. It can be prepared during spare moments, saving much valuable time of pupils. Dictation of questions, problems, exercises, and the like to large classes is a waste of valuable time. Furthermore, dictation and copying errors are eliminated, and the exercises may be placed in notebooks to be kept permanently. Putting materials on the blackboard while classes are in session causes the teacher to turn away from the class, often a disadvantageous procedure. In the secondary schools, students in the commercial department are glad of the opportunity to cut stencils and mimeograph materials. These students practice an activity related to their future vocation and the teacher's time is conserved. In many schools economy demands that the students print their own school paper and yearbook if they desire these publications. Schools with print shops usually delegate this task, at least that of the school newspaper, to the shop, but many junior and senior high schools and nearly all elementary schools are without print shops. Mimeographed papers and yearbooks can be made quite satisfactorily. At a P.T.A. meeting in a junior high school, the students dramatized the publication of their school paper. Student reporters appeared with the news, a stencil was prepared on a typewriter (to shorten the process seven or eight stencils had been prepared in advance), stencils were mimeographed, pages were sorted and stapled. In the space of half an hour an eight-page newspaper was ready for distribution to the parents.

Several of the larger manufacturers of stencil and gelatin duplicators have prepared "books" of master copies of various exercises, problems, outline maps, and so forth, so that busy teachers may simply detach a needed exercise from the "master copy book" and duplicate as many copies as needed. Such a procedure may not be as satisfactory as having the teacher prepare the master copy, but certainly a defensible measure for the preparation of seat work, drill exercises, and certain other types of exercises. These "master copy books" have been edited by leading educators and are quite as sound educationally as similar material found in textbook form.

Types of Duplicating Devices Used by Schools. Nearly every known type of duplicating device has been tried out by the schools. Some of these will be listed and the more common ones discussed briefly:

- Stencils
- Stencil duplicators
- Gelatin duplicators
- Carbon paper
- Block printing
- Etching
- Silk screen stencils
- Photographic screen stencils
- Letter-press printing

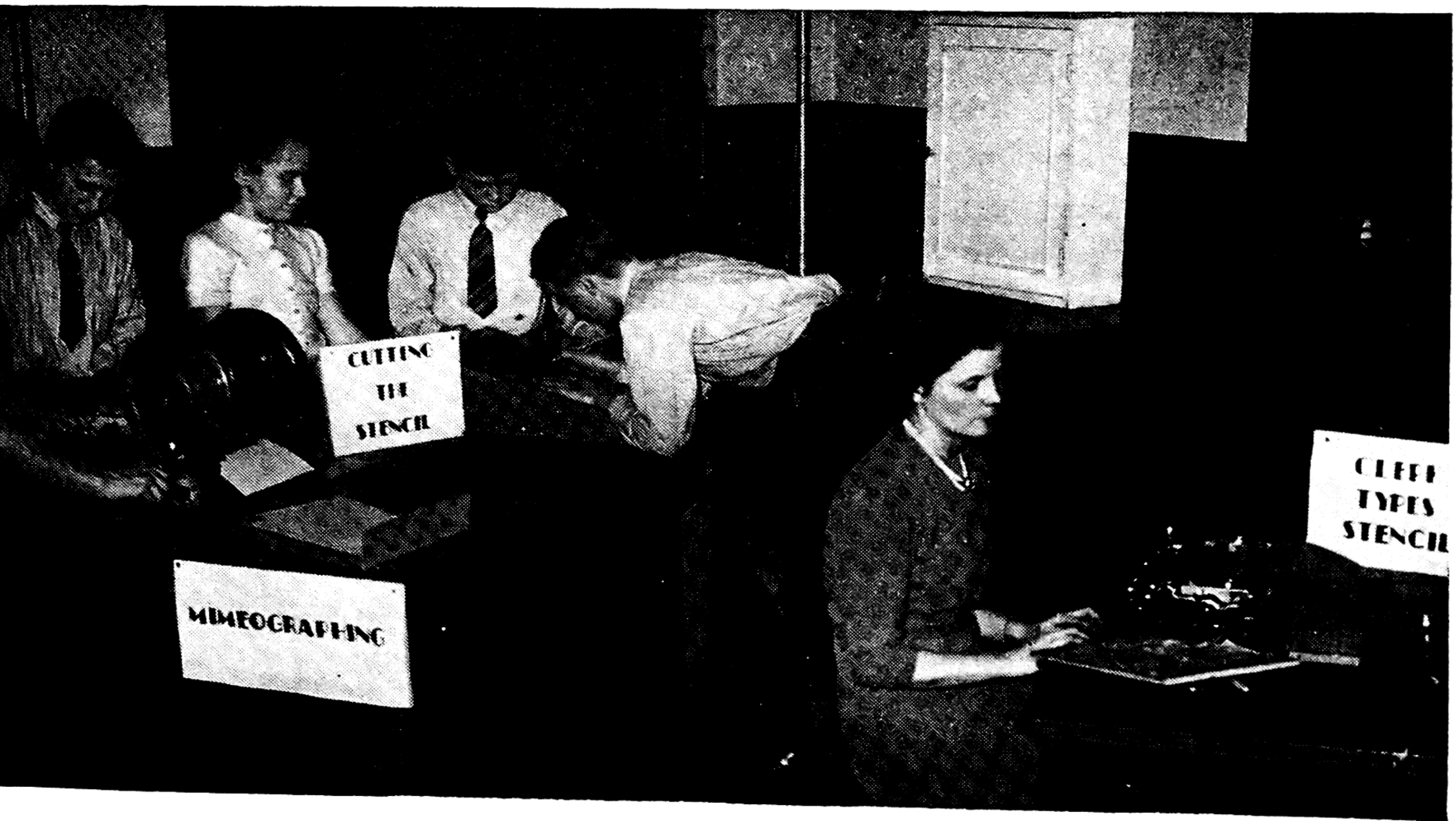
A stencil is a thin plate or sheet of metal, leather, paper, or composition material cut or pierced with a design or pattern. The stencil is laid over a surface and paint or ink is brushed or rubbed over it, thus leaving the ground color of the surface imprinted with the lettering, design, or pattern of the stencil. Stencils have been used for many years in the elementary schools, particularly for blackboard decoration purposes in connection with holidays. Smaller stencils may be made or bought for children to reproduce pictures of birds, animals, trees, and other pictures on paper at their seats.

Block printing and etching are taught in many art courses but are not commonly used in the average classroom. A music teacher[3] in a junior

[3]Boyer B. Allen, Johnstown, Pennsylvania.

An office clerk helps boys and girls mimeograph the school paper.

COURTESY OF PITTSBURGH PUBLIC SCHOOLS



high school in Johnstown, Pennsylvania, has developed a modified etching technique which produces excellent results. Mica is used as the medium instead of metal. It is soft, inexpensive, and transparent. It is, therefore, possible to place the mica over a design or picture and with a sharp instrument score the design on the mica. (A phonograph needle pushed into the end of a wooden skewer is suggested.) After the plate is made, a thin, absorbent rice paper is used for the printing. The plate is first inked with printers ink and wiped off with a soft cloth. The paper is water soaked, blotted, and pressed over the plate. As many as three hundred copies may be made from one plate. This particular teacher uses this device to provide copies of pictures of composers and short musical selections (not copyrighted). Mica can also be used as a medium for the making of excellent lantern slides.

Silk screen stencil work has been borrowed by the schools from its commercial locale. Technical schools and art departments are regularly giving instruction in this type of work which lends itself so admirably to the production of posters, show cards, and illustrations. Formerly, the method has been to use shellac or some other similar liquid on a silk screen to block out the open areas of the stencil, and ink was then forced through the open areas with a squeegee. Recently, a substance called Nu-Film has replaced this older method. The process is now simpler, and finer results can be accomplished. Nu-Film is a gelatin substance with a paper back. Designs are cut out and the gelatin stencil is adhered to a silk screen with a liquid cement. Inks or paints are then forced through the stenciled screen onto paper or show cards. Multiple color work is done by preparing stencils for each color portion of the illustration and then screening the colors in succession, superimposing one upon the other. With many colors the work becomes long and tedious and the difficulty of perfect register during the superimpositions is bothersome.[4]

Still more recently *a photographic silk screen* method has been invented. Stencils are made photographically, thus eliminating the time involved in cutting the stencil out of the gelatin. This short process is fundamentally the same as the above, but a photographic darkroom is necessary. Either method is relatively inexpensive after the first outlay for materials. The screens can easily be washed and used over and over.

[4]Information about this process may be secured from Silk Screen Supplies, Inc., 33 Lafayette Avenue, Brooklyn, N. Y., or Active Process Supply Co., 28 W. Houston Street, New York 12, N. Y.

No better method for poster construction has yet come to the author's attention.

Carbon paper is a common type of duplicating material which is simple and effective to use when only five or six copies are needed. Its use in the business world is so widespread that commercial departments in the school accord it an important place in their work. Its uses for the teacher are so obvious that further comment is unnecessary.

Perhaps the history of carbon paper is not so well known. Its invention is credited to Ralph Wedgewood of London in 1803. The discovery was put to no practical use. In 1823 Cyrus P. Dakin of Concord, Massachusetts, claimed to have discovered it, maintaining that he had never heard of Wedgewood's paper. Dakin moved to New York and was listed in the New York Directory of 1826 as a saddler, but the Directory of 1832 listed him as "manifold writer." No great use was made of carbon paper until 1868, when the Associated Press, predecessor of the present association, adopted it for making pencil copies of dispatches.

The mimeograph, or stencil duplicating process, was invented about fifty years ago by Thomas A. Edison. Its wide use today is attributed to its efficiency, economy, speed, and flexibility. Typed material, handwriting, drawings, graphs, maps, designs, and diagrams can be reproduced speedily in hundreds of copies at low cost. This stencil process is similar to all stencil processes except that the stencil is fastened over a revolving inked or self-inking cylinder. The ink then passes through the "cut" stencil to sheets of paper. It is a machine process essentially. Machines of various types, sizes, and costs are available.

Mimeographing machines are common in schools. Teachers should know how to use and to explore their possibilities in the preparation of classroom materials. Pupils, too, should know how to use the mimeograph if one is available. Schools equipped for duplication of material find hundreds of uses for the machines: by teachers, administrative offices, alumni associations, athletic associations, clubs, libraries, shops, and laboratories. In the classrooms, much unprofitable copying by students is thus eliminated.

Gelatin duplicators made their appearance about the turn of the century. At first they were simple pads of gelatin and glycerine reposing on metal or wooden trays. The gelatin duplicator is simpler than the stencil duplicator. A "master copy" is prepared by writing, drawing, or typing on smooth paper with a hectograph carbon, typewriter ribbon, ink,

or color pencil. The impression from the "master copy" is then transferred to the gelatin pad and copies are "run off" by bringing paper into momentary contact with the pad. This method of reproducing materials is cheaper than the stencil process, but fewer copies (less than one hundred) can be made from a "master copy." Use of color is also simple with the hectograph process. Practically everything that has been said about the values of the stencil duplicator might be repeated for the gelatin duplicator.

A. BLACKBOARD

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Why is the blackboard one of the most important of all visual aids?
2. Is the blackboard usually underworked? Overworked? Is its use stereotyped?
3. Where should blackboards be placed in classrooms? How much blackboard space should be provided for every pupil?
4. Comment: "I can pretty well judge the effectiveness of a teacher as soon as I enter her room and take a look at the blackboard."
5. A generation ago the individual "slate" was common. Today it has practically disappeared. Why? What purpose did it serve?

LABORATORY EXERCISES

1. Provide the class with a supply of good-grade colored chalk (Poster Pastello, Excello Squares, Ambrite, or similar materials) and develop projects for the blackboard such as chalk talks, stick-figure cartooning, murals, or illustrations to accompany the teaching of particular lessons as in nature study, botany, crafts, safety, etc. If the projects are assigned to committees rather than to individuals, those with poor art ability will not be discouraged.
2. The author knows of only one motion picture film which deals with the blackboard. A screening and discussion of this film will be worth while. The film is, *The Blackboard,* 10 minutes, black and white, 16-mm., produced by Official Films, Inc., 25 West 45th Street, New York 19. For distribution, write the producer or consult your local distribution library.
3. The Weber Costello Company, Chicago Heights, Illinois, has available for free distribution a booklet entitled "How to Use the Chalkboard." Write for copies. It is especially valuable for a discussion of colored chalk. The class might like to test the findings given in this booklet which deal with colors which are easy to read, difficult to read, those which are difficult to erase, etc.

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B. BULLETIN BOARD

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. What criticism can you offer of the majority of classroom bulletin boards which you have seen?
2. Describe the most effective bulletin board you ever saw. Why was it effective?
3. Do you agree with the items and the point evaluations in the rating scale given in this chapter? What changes would you make?
4. Assuming that the materials on the bulletin board have been furnished by the teacher, would you have the pupils rate the project?
5. Comment on the following statement made by a high school teacher, "All

modern classrooms contain at least one bulletin board; and yet there are few visual aids that are more misused, neglected, or are greater eyesores."

6. What are the possibilities of using plastics for chalkboards and sponge rubber for bulletin boards?

LABORATORY EXERCISES

Each student should prepare a bulletin board exhibit on any subject or topic. It should be arranged in advance of the meeting of the class and should be left on exhibit for one to five days. Each member of the class should rate the bulletin board exhibit of every other member of the class. Use the Rating Scale provided in this chapter, or prepare a new one. Mimeograph a supply of these for all members of the class. In the mimeographing, the items may be moved over to the left side of the page and then six to eight columns provided at the right of the score values. Thus six to eight evaluations may be put on the same sheet of paper. Arranging a weekly bulletin board by committees might well be a running project throughout the entire semester.

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C. DUPLICATING DEVICES

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Aside from those mentioned in the text, what other duplicating devices do you know? Describe them and their uses.
2. What is linoleum block printing? Explain its uses.

3. Prepare schedules of costs on the various types of duplicators discussed in this chapter.
4. Is there danger of making secretarial flunkies out of teachers by emphasis upon teacher-made materials, especially duplicated materials?

LABORATORY EXERCISES

1. Each student should learn to do one or more types of duplicating during the semester; which types will depend upon the equipment available.
2. Make a "handmade" gelatin duplicator in the laboratory period. Materials needed: shallow pans, 9″ x 12″ or larger, one pint of glycerine, and 2 ounces sheet gelatin. Method: boil in double boiler for two hours. Pour into shallow pan. Remove any foam. As mass cools, prick air bubbles with a pin. To make copy: prepare "master copy" with hectograph ink or pencil. To print: place "master copy" face down on the gelatin; smooth it out with a cloth or rubber roller; remove after two minutes. Put sheets of paper on gelatin one at a time, smooth out, let stand for a moment and remove. To clean gelatin for next project: wipe with a damp cloth or sponge and lukewarm water.
3. Make linoleum print blocks. Print greeting cards, menus, programs, etc. Consult a standard reference on method.
4. Prepare "sticks" for stick printing. Arrange a project.
5. If materials are available, investigate the silk screen process. The art department can probably give you help.
6. Several good motion pictures dealing with duplicating devices are available. Rent these films and project before the class. Study the processes. To what extent are these feasible school projects? The films:
   a. *Simple Block Printing:* silent or sound, 10 to 15 minutes. "After a few examples of block printing are shown, the entire process of making such prints is demonstrated. The various tools needed are displayed and the work of each is clearly shown." Rental—$2.00 for sound, $1.50 for silent; Brandon Films, Inc., 1500 Broadway, New York City, or try your local rental library.
   b. *The Technique of the Silk Screen Process:* silent, 15 minutes. "Valuable for anyone interested in reproducing art work, posters, fine prints . . . a proponent of the use of the silk screen demonstrates the entire process. Highly recommended." Rental—$2.00; Brandon Films, or your local library.
   c. *Linoleum Block Printing:* silent, 15 minutes. "Ruth Gikow demonstrates the cutting and printing of the linoleum block." Rental—$1.50; International Theatrical and Television Corporation, 25 West 45th Street, New York 19; or your local library.
   d. *Make a Linoleum Block:* silent, 15 minutes. "A demonstration by Florence Ludins of the cutting of a linoleum block, showing the use of cutting tools, and the printing of the block." Rental—International Theatrical and Television Corporation; or your local library.

7. Write to the following companies for information about the commoner duplicating devices; also investigate the possibility of there being a local distributor in your community:
   a. *Ditto:* Ditto, Inc., 641 Oakley Blvd., Chicago, Ill.
   b. *Mimeograph:* A. B. Dick Company, 720 W. Jackson Blvd., Chicago, Ill.
   c. *Portagraph-Dexigraph:* Remington Rand, Inc., 315 Fourth Avenue, New York, N. Y.
   d. *Lettergraph-Hectograph:* The Huyer Corp., 901 W. Jackson Blvd., Chicago, Ill.
   e. *Rex-o-graph:* Rex-o-graph, Inc., 3721 N. Palmer St., Milwaukee, Wis.

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Chapter 6

PICTORIAL VISUAL MATERIALS

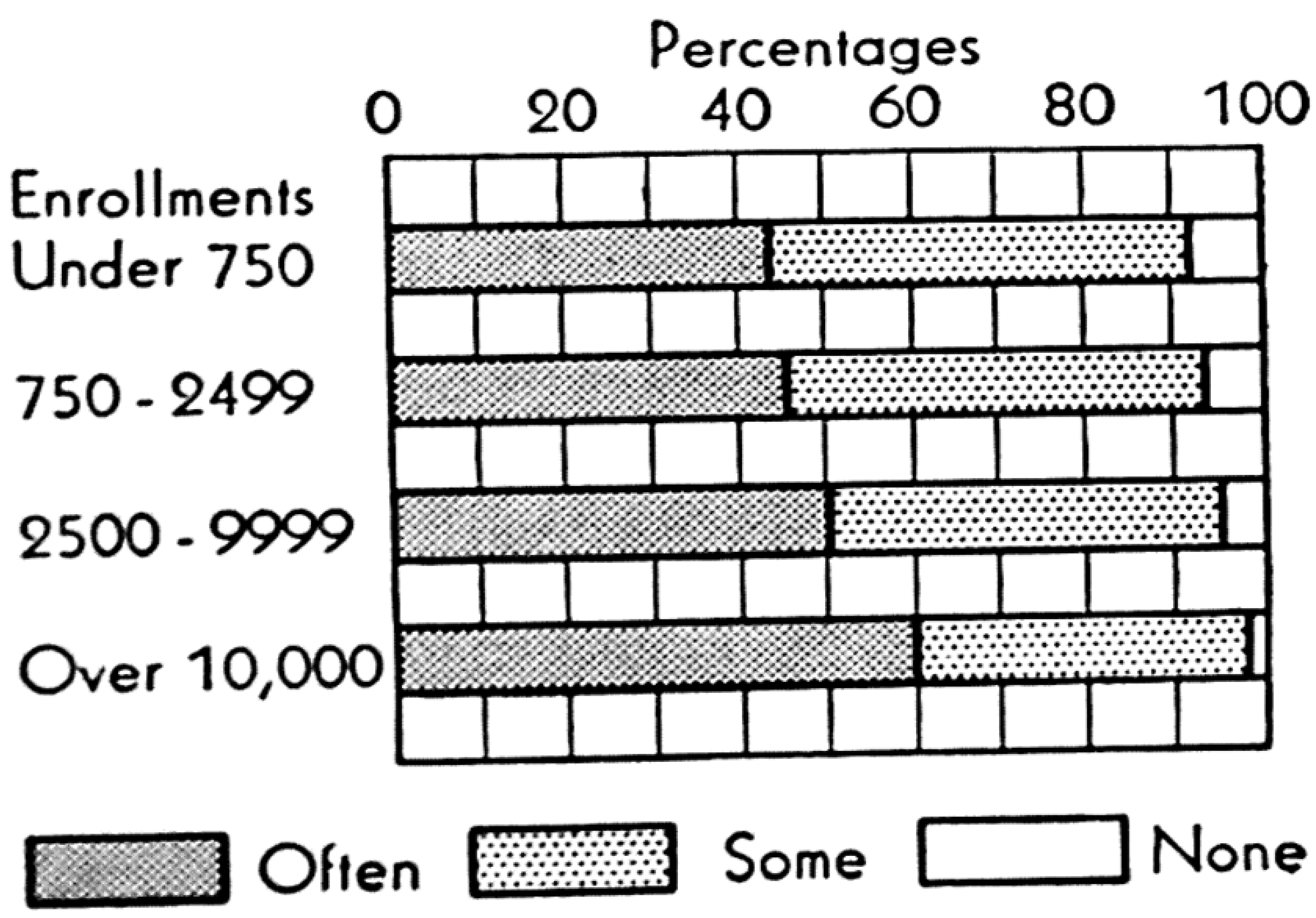
To represent pictorially or graphically means to give visible surface representation of a natural or imaginary scene, object, or incident through the media of photography and the graphic arts. The term *graphic* comes from the Greek, meaning to write or to delineate by painting, writing, drawing, sketching, or diagramming. The word *photographic* has a similar meaning except that the prefix of the word is the combining Greek form meaning light. Pictorial and graphic representations have multitudinous uses in the schools. The discussion in this chapter will be limited to flat, still pictures such as photographs, textbook illustrations, prints, cut-outs, post cards, magazine and newspaper clippings; the following chapter will deal with the more typically graphic representations, such as drawings, sketches, charts, graphs, cartoons, posters, maps, and diagrams. Slides, films, and stereographs will be discussed in later chapters.

Although the camera and photography will be accorded extended treat-

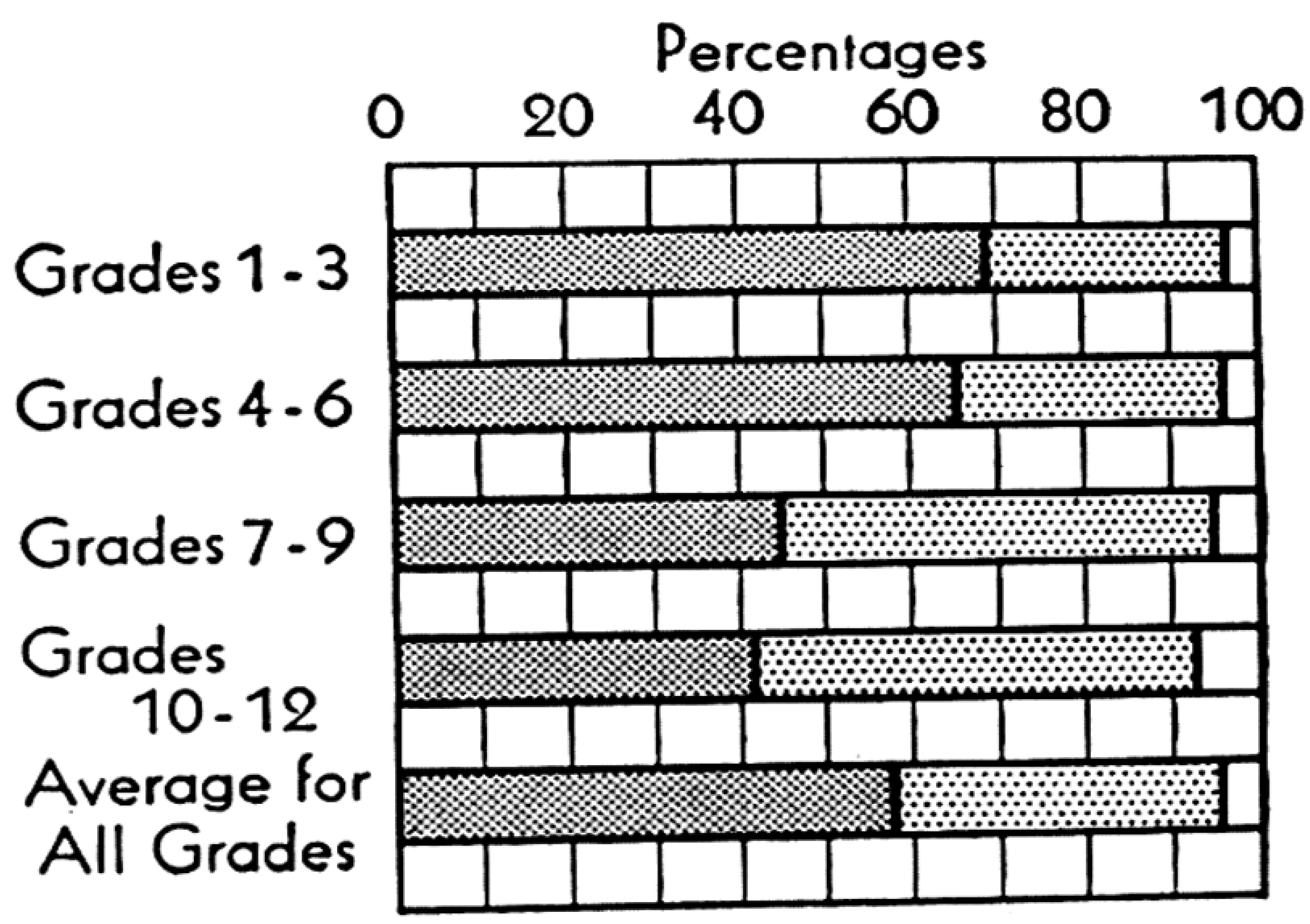
ment in a subsequent chapter, brief mention must be made of photography because some of the pictorial representations to be analyzed at this time are based on this medium. On January 9, 1939, the centennial of photography was celebrated. It was many years after the invention of the camera before it had any bearing even indirectly on formal education and teaching. Before the invention of the camera, events and scenes to be saved for posterity had to be painted. Etchers, engravers, and lithographers were providing illustrations; but their work was slow because of hand processes, and they, too, had to depend upon the pen of the artist. It is only within recent years that cameras have come to be a part of the paraphernalia of teachers. Their use in the classroom even today is not fully understood, but publishers have been using photographic reproductions of one type or another for years. Therefore, when teachers or the members of a class start to search for illustrative material, the chances are that the majority of their collection will be reprints from photographs, whether the pictures are obtained from books, pamphlets, newspapers, or magazines. Reprinted pictures are not, however, limited to material photographed; any drawing, sketch, or painting may be photographed and reprinted.

PICTURES

Introduction. Replies to questionnaires sent to the schools of New York state showed that pictures were the third most commonly used visual material. Pictures were surpassed only by the school journey and charts-graphs-diagrams. The Cleveland public schools report that picture

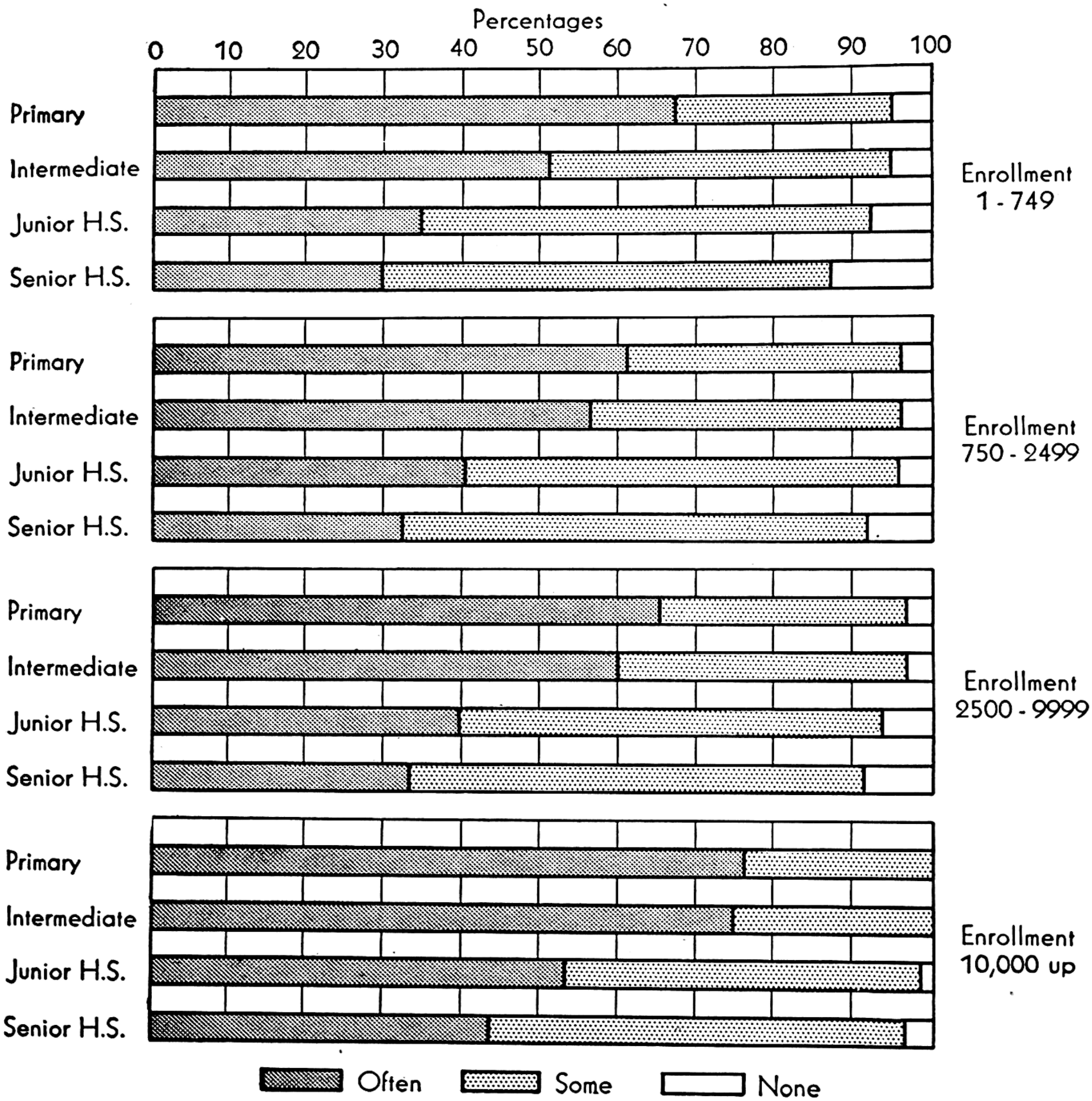


Frequency of Use of Mounted Pictures in School Systems of Various Sizes



Frequency of Use of Mounted Pictures According to Different Grade Levels

sets are more widely used than any of the other visual learning materials. In a typical school year, the average Cleveland school building used six thousand mounted pictures from the central distributing office. There is no way of knowing how many additional hundreds were furnished by teachers and pupils. Some years ago, the United States Office of Education, with the co-operation of the American Council on Education, undertook a nation-wide survey to determine the extent and use of visual aids. Replies from 8,806 school systems were received. These



Frequency of Use of Mounted Pictures in Schools by Grade Levels and Size of System

replies indicated that mounted pictures were the fourth most commonly used visual materials. Pictures were exceeded in extent of use by wall maps, charts and graphs, and posters and cartoons. The graphs on pages 96 and 97 show the frequency of use of mounted pictures in different types of schools.[1]

The foregoing figures show graphically the extent to which mounted pictures are used in representative schools of the United States. The graphs indicate that larger schools use more pictures than smaller schools. They also indicate that the lower grades make a more extended use of pictures than the upper grades.

These older surveys of the New York principals and the United States Office of Education are corroborated by a more recent one conducted by the National Education Association. Although the materials were grouped in slightly different fashion, this study showed that 95 per cent of the 1037 school systems involved in the survey used flat pictures, charts, and posters. This percentage was exceeded only by a 98 per cent utilization of maps and globes.[2]

Primary Learning Materials. How many times have we heard teachers say, "I wish I could find some pictures about ______ for my class." The collecting, sorting, mounting, filing, and using of pictures will be discussed shortly, but first, what of the values of pictures? Are they of more than passing interest? The widespread use of these materials tends to lend some weight to their value, but does not *prove* their value. Business, commerce, and advertising make extensive use of pictures, based on psychological experimentation. Experimental evidence supporting the value of pictures in teaching is abundant. Pictures are not used just for interest or recreation. To these important values are added others, namely, enriched experiences, clarified meanings, extended vocabulary, greater use of imagination and curiosity, and new information.

In a pioneer study Weber[3] compared the values of prints, lantern slides, and stereographs. The investigation sought to throw light on a number of questions. Among them were these: (1) What is the observa-

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[1]Adapted from Koon, C. M., *School Use of Visual Aids*, Bulletin, 1938, no. 4, Office of Education, Washington, D. C. Data in bulletin were abstracted from the complete inventory.

[2]Research Division, National Education Association, "Audio-Visual Education in City School Systems," *Research Bulletin*, 24: 158, December, 1946.

[3]Weber, J. J., "Picture Values in Education," *The Educational Screen*, 1923.

tion span in looking at pictures? What does a longer attention given to a particular type of picture mean, does it, for example, imply deeper interest and consequently greater effectiveness? (2) What do children really see in observing a picture? Which type of picturization stimulates more ideas? (3) Do pictures enhance the verbal lesson by increasing the amount of ideational learning? Briefly, the results of the investigation were: (1) Without any directions children gave a voluntary attention of approximately twenty seconds to a picture. The attention given to stereographs was 11 per cent and to lantern slides 6 to 8 per cent longer than that given to prints; novelty may account for this difference. (2) Prolonged attention is symptomatic of higher educational value. The number of ideas received from the three types of pictures correlated significantly with duration of attention span. (3) Pictures of all three types enhanced the verbal lesson in amounts, shown by three types of tests, ranging from 5 per cent up to 100 per cent. Earlier, in connection with a doctoral study at Columbia University, Weber carried on a similar investigation, sketching and writing a description of a hypothetical animal. One group of children was shown only the picture; the description was read to a second group; and a third group was given both the picture and the description. Weber concluded that the picture was more effective than the description, and that the combination of verbal and pictorial presentation was superior to either verbal or pictorial alone.[4]

Many studies of the value of illustrations and pictures have been made. Dissertation studies by Bamberger[5] and Mellinger,[6] in addition to stressing general values, analyzed certain picture specifics. Bamberger found that children prefer books with numerous pictures (large full-size pictures were preferred to small pictures) and that humor and action pictures with storytelling qualities were in demand. Mellinger found that colored pictures were preferred over black and white pictures, and that three-color pictures were more interesting to children through the fifth grade than two-color pictures.

Authors and publishers expend much time and money to obtain pertinent and meaningful illustrative material. Any device which clarifies

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[4]Weber, J. J., "Comparative Effectiveness of Some Visual Aids in Seventh Grade Instruction," p. 57, *The Educational Screen*, 1922.

[5]Bamberger, Florence E., *The Effect of the Physical Make-Up of a Book Upon Children's Choices*, Johns Hopkins Press, 1922.

[6]Mellinger, B. E., *Children's Interest in Pictures*, Bureau of Publications, Teachers College, Columbia University, 1932.

meaning aids in comprehension. Pictures, charts, graphs, maps, and so forth, have abundantly demonstrated their ability to clarify meaning when properly applied. Naturally, abuses are possible, confusions may result, and erroneous ideas may follow. For example, and this is not stretching the point too much, it may be possible to have pictures so alluring that interest and learning are completely sidetracked by the vicarious sensory experience, but these instances all violate well-established psychological laws and pedagogical practice.

Pictures have an assured place in the teaching-learning process. Many times during the course of the day a teacher may say, "I'll show you," as she turns to the blackboard to illustrate her point. A salesman uses his pencil as he talks and sketches his ideas to make himself more clearly understood.

Prints, photographs, and other flat, unprojected pictures have their greatest value in the fact that the learner gets more and clearer ideas than he does from narrative alone. Pictures extend experiences and their realism reduces misinterpretation and verbalism. They can assist the learner materially to organize his ideas about the topic under consideration. They are particularly apt in showing step by step developments, contrasts and comparisons, and status of things, events, processes, scenes, and even ideas.

No one would contend that pictorial materials do not create interest and provide motivation. Even without color, pictures get attention; and the better the composition and structure, the greater this interest.

Dozens of studies show that retention is greater when narrative material is supplemented with pictures. Periodicals, newspapers, and advertising agencies use pictures not only to get attention, but to make a more lasting impression.

Photographs and prints are exceedingly economical and widely available. There is practically no end to their variety, and their flexibility of use speaks for itself.

Learning to Look at Pictures. What do people do when they look at pictures? What does the teacher wish to have the pupils do when she says, "Study these pictures carefully"? A direct experimental attack was made on this question in 1935 by Professor Buswell[7] of the University

[7]Buswell, G. T., *How People Look at Pictures*, The University of Chicago Press, 1935. The author later summarized his study in the article, "Learning to Look at Pictures," *Progressive Education*, 13: 422–26, October, 1936.

of Chicago, who arranged an ingenious method of photographing the eye movements as a subject looked at a picture. Eye movements in looking at pictures are essentially the same as those involved in reading. In this experiment the eye movements were photographed and the duration of fixations was recorded. In the end a mass of results was obtained on perceptual patterns, including the "once over" and the study of pictures. More specifically the results were:

1. First general pattern: beginning with the center of interest in the picture, the eyes rove about over the picture in a general survey with relatively short fixation periods.

2. Second general pattern: the general survey is followed by a close examination of details of the picture. The fixations are longer and the fixation spots are more concentrated. This type of examination appears "to indicate a mental process of reflection or at least a higher degree of interest" than that of the general survey type.

3. Directions given the subjects at the time they looked at the pictures had much to do with their ultimate perception pattern. When told simply to look at the picture, the results were usually of the survey pattern type. If the directions included "look carefully," a detailed examination with longer fixations resulted. If the subjects were given a page of printed comments on the picture before seeing it, detailed examination with longer fixations usually followed. In some instances subjects saw the pictures, then read a description, then had a second look. Reading always increased the number of fixations, for example:

	Average Number of Fixations before Reading	Average Number of Fixations after Reading
Picture No. 11	61.3	108.8
Picture No. 12	77.0	91.8

4. Pictures which the subjects said they liked were examined more carefully than those they did not like.

5. Large individual differences in both types of patterns were found.

6. Color failed to have the marked effects anticipated. It, however, had some effect. It is entirely possible that this aspect of the study needs further investigation.

7. The perceptual patterns of sixth-grade children were quite similar to those of adults both in type and duration of fixations.

Values Lie in Utilization. An understanding of techniques in the use of pictures is essential to understanding their utilization. What is the character of the education that the pictures are expected to assist in building? Provincialism of mind comes from stereotypes or ruts or grooves resulting from doing and thinking in exactly the same way in a narrow, restricted environment. What will break up this provincialism? Anything which challenges the easy-going, effortless ways of doing things is likely to have a salutary effect. Mingling with new groups who think and act in different ways, not necessarily better ways, tends to be thought-provoking. The reading of stimulating, challenging books, or looking at pictures—motion pictures and art exhibits—will also be of assistance in bringing forth new ideas. Judgment and interpretation depend upon experience, and enriched experiences tend toward tolerance and urbanity. How do pupils interpret their subject matter, their environment, their world? They interpret it as they experience it with the background against which they can throw their experiences for evaluation. Do pictures help build the background on which future experiences can be evaluated? Do they assist pupils in experiencing in concrete and meaningful ways? Do they broaden and enrich?

There has never been a definite methodology for presenting pictures to pupils for study. In fact, it has been assumed that anyone *can* hold up a picture to a class, and that anyone *will* hold up a picture to a class when a picture is needed. Manifestly teachers experience varying degrees of success in using identical instructional materials. There should be a body of principles of picture presentation.

Pictures and illustrations are not a substitute for books and other learning activities. Their function is a helping or supplementary one. Pictorial materials have proved their value in ways already enumerated, the chief four of which are: (1) motivating interest and learning, (2) providing source material for study and investigation, (3) providing artistic and esthetic development, and (4) providing cues which lead to creative effort.

Before any pictorial or graphic representations are used they should be given a simple test against these criteria:

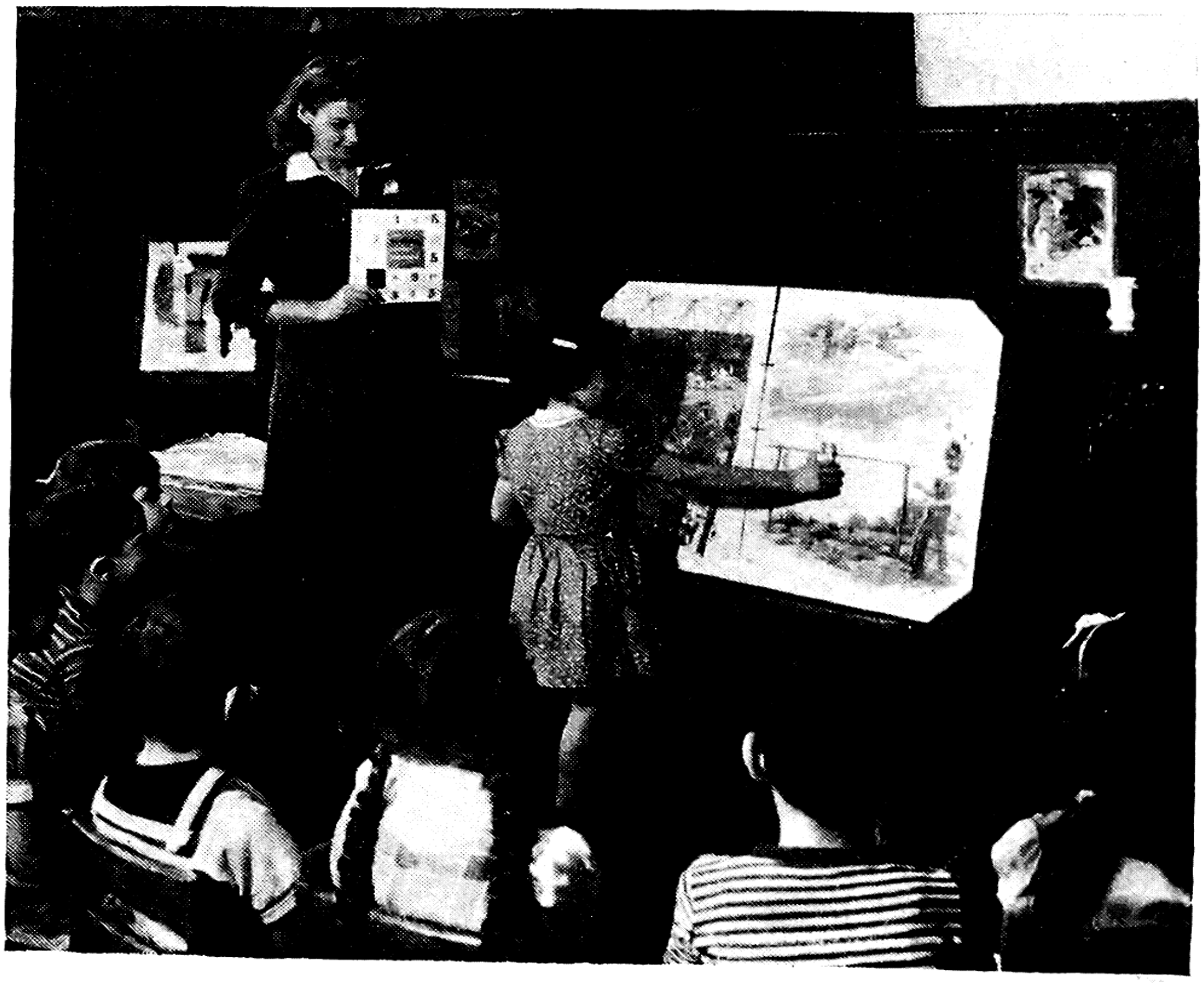
What ideas do they convey?
What misrepresentations will they clear up?
What questions do they answer?

What creative activities will they foster?
What emotional reactions will they provoke?
Do they lead to further study?
Will other types of material accomplish the objectives more effectively?

Every teacher knows the great variety of uses to which he can put pictorial materials, ranging from source material for study and evaluative materials to entertainment and decoration. Lesson assignments, reviews, and tests can be given through pictorial materials. Also, they add immeasurably to demonstrations and oral reports.

The proper utilization of pictures depends upon an understanding of the technique involved in their presentation and upon the selection of the correct materials. Teachers must plan for the use of pictures. They cannot be "thrown" at the pupils and be expected to accomplish very much. They must be used with a definite purpose in mind. In other words, they must contribute to the teaching objectives. It will do little good for the teacher to admonish the pupils to study the pictures. The pupils must be taught how to study them, what to look for, how to compare and criticize, how to evaluate, and how to relate the pictures to other curriculum materials.

The presentation of pictures loses effectiveness when there are too many at the same time; a few appropriate, well-chosen ones serve much better. Photographs and prints should be arranged in sequence in sets. The set should be kept to one idea, for example, salmon fishing or wheat



The use of pictures enhances the story.

FROM *Primary Activities*, SCOTT, FORESMAN AND COMPANY

growing. There may well be two or three series around a certain topic, or the topic may be subdivided, as farming on the small farms of New England and farming in the agricultural Middle West.

Group presentation of unprojected pictures always carries the problem of arranging the pictures so that all the students can see. It is helpful to have large mounted pictures prominently displayed and left in position for later study. For individual study, there are many satisfactory ways of handling pictures; for example, they may be left on a reference or browsing table in the classroom or kept at the teacher's desk. In any case, they should be easily available to the pupils.

Naturally, the pictures should be suitable to the grade level of the pupils. Use, too, varies with grade level. For beginners, cutting and pasting is an important process. For more advanced pupils, the value comes through enriched learning by adding to the experiential background, by correcting misinformation, and providing a stimulus for further study and research. At all levels, pupils should be encouraged to ask questions and to discuss the pictures.

There should be a general avoidance of complex, confusing pictures. Simplicity as a result of few details being involved in a central idea makes a good teaching print. Involved pictures divide the attention and often leave the child feeling frustrated and inferior. He thinks there is something in the picture which he is not getting.

The pictures should be scrupulously truthful and authoritative. Half-truths are out. If the teacher questions the reliability of a picture, she should lay it aside until its status can be determined. She should question the picture for honesty of color if it is a colored picture, because so many pictures have been tinted by clerks whose only criterion is eye appeal; in this respect, picture postcards need to be closely checked. Unless the color is correct, the teacher should discard the picture, or use a black and white print. To be of most value the picture must give an accurate impression of the size involved. The better pictures will always include some object that the pupil can use for dimensional understanding; a picture of the steamship *Queen Elizabeth* can be entirely misleading without some object of known size with it. Weird angle photography is currently modish; such pictures are unsuitable, generally speaking, for instructional purposes, although they may be very fine for the esoteric salons. Pictures can convey propaganda—both subtle and direct; often they reflect the bias of the one doing the selecting or of the photographer.

Prints for class use should be suitably labeled showing dates, source, and possible reliability. Verbal explanations are essential.

Few schools have made much headway in providing pictorial materials for home study, yet there is no reason why picture sets should not be charged out of the library as books are. A few schools have experimented with sponsoring special art collections. If properly mounted, these specimens can be allowed to circulate among the homes, whether free or on a maintenance-fee basis. Such a procedure may bring artistic and cultural enrichment into the lives of the pupils.

Finally, the teacher should not adopt the principle that pictorial materials are sacred. Their value lies in utilization. Pupils should be encouraged to exercise care in their use, as with books and other materials. But, pupils must get their hands on them.

Can you think of any experience unit which might be developed by the teacher and pupils in which pictures will not play a vital part? How else can children know how their community gets its food, for example, except to gather source material, and to study, explore, and evaluate this material? Much of this material is obviously found in the pictures of food, its production, transportation, distribution, the elements of trade involved, and the people who do the work. Any other socially significant problem or activity of interest and importance to the pupils will make the same extended use of pictures of many sorts. As teachers and pupils plan together to solve the problem before them, they will want *to see* what the elements of the problem are. In addition to flat pictures, the group will surely want to see movies, take trips, use recordings, call in resource persons, and do a host of other things which are pertinent to the problem. In this way problems are analyzed and understood. Or, if the school is organized along conventional subject-matter lines, pictures should play no less a part.

How a Collection Is Acquired. Pictorial collections grow. The presence of these materials in the schools is attributed largely to one of two sources—the teacher and the school district. There is a difference of opinion as to whose responsibility it is. Perhaps a good compromise is to indicate that the responsibility should be shared. Districts should assist teachers by equipping the schools with pictorial material, certainly with those of a more lasting nature such as reprints of great art masterpieces and other pictures which are copyrighted. It is reasonable to ask for budgetary

assistance. Most city schools, particularly those with organized divisions of visual education, purchase pictorial materials and make them available to the schools just as they make available lantern slides and motion picture films.

If the school will provide no pictorial materials, why should not the teacher start her own collection? Modern educational philosophy stresses the fact that educational growth prospers most where effort and ingenuity replace effortless activity. No teacher or school is so poor or so isolated that a splendid collection of pictorial materials cannot be accumulated over a period of time without a significant expenditure of money. Pupils will gladly help. The teacher-pupil-built collection may have the advantages of timeliness, relevancy, and vitality. The permanent school collection may tend to be stereotyped. Viewed in another way, one collection may be quickly outdated, the other more permanently useful. Both types are needed.

Pictures are available on every hand. Picture postcards and magazines are everywhere. Pictures are abundant in such magazines as *Time, Life, Asia, National Geographic, Nature Magazine,* and *Building America;* also in the rotogravure section of the Sunday newspaper. Illustrations taken from advertisements can be shorn of their advertising matter and made to serve a useful function.

Directions for Mounting. There is no *the way* for mounting pictures, except to say that the completed job should be neat and artistic and should follow along the educational lines which the picture is intended to serve. A decade ago art teachers and supervisors when discussing the mounting of pictures sedulously specified types of mounting paper, color, size, uniformity, margins, and paste. Today, a reckless courage in art centers and classrooms is seen in such matters. About the only guiding principles to be laid down are: (1) avoid cheapness in appearance, (2) keep the result neat, attractive, and artistic, (3) avoid glare, (4) use any color of mounting paper which harmonizes or contrasts with the dominant tones of the print, (5) use margins if you choose (some of the most artistic book and magazine illustrations have no margin at all—edges are "bled"), (6) mount more than one picture on a page if it is desirable—artistic and related pictures of varying sizes may be used in a "layout," (7) provide relevant captions and proper labeling.

Obviously, temporary and permanent materials call for different

treatments. Clippings, newspaper cutouts, post cards, and similar materials have rather transitory value, and do not need the durable mountings used for reproductions of great art masterpieces. Neatly trimmed and pasted edges and corners are always an asset. Curling and blistering in mounting spoils a picture, and can be prevented with good paste, a rubber roller, and the use of a press or weights. Schools equipped with electric thermal-presses will want to mount their pictures by using wax adhesive sheets for bonding the picture to its mount. Flat-irons may be used if an electric press is not available. The adhesive tissue can be purchased from any photographic dealer or supply house. Folders or cutout mounts add a professional touch and are worth the time and money in some instances. The cutout mount is made by cutting two mounting boards, one slightly heavier than the other, the same size and suitable to the print to be mounted. Place the print on the better board and mark the edges lightly. Then cut out the panel about one-fourth inch inside the outline. The knife should be slanted outward so that the edge will have a beveled appearance. Mount print on backing-board and then paste the outside frame over it.

Filing and Housing. Pictures should be catalogued, filed, and housed so that they can easily be located, preserved, and used again, if needed. Often time and money are spent in collecting and mounting pictures, only to have them thrown into a cupboard to gather dust and deteriorate.

Cataloguing is most important. Pictures can be catalogued just as books are, so that a glance through the index tells what is available in the collection; the number on the card will locate the particular reference. Librarians, both school and public, are performing invaluable services in their preservation of picture materials. City systems with central materials bureaus usually publish indexes or catalogs which list all available materials, and a copy of the listing is provided for every teacher in the system. Materials are suitably described and may be requisitioned by any teacher.

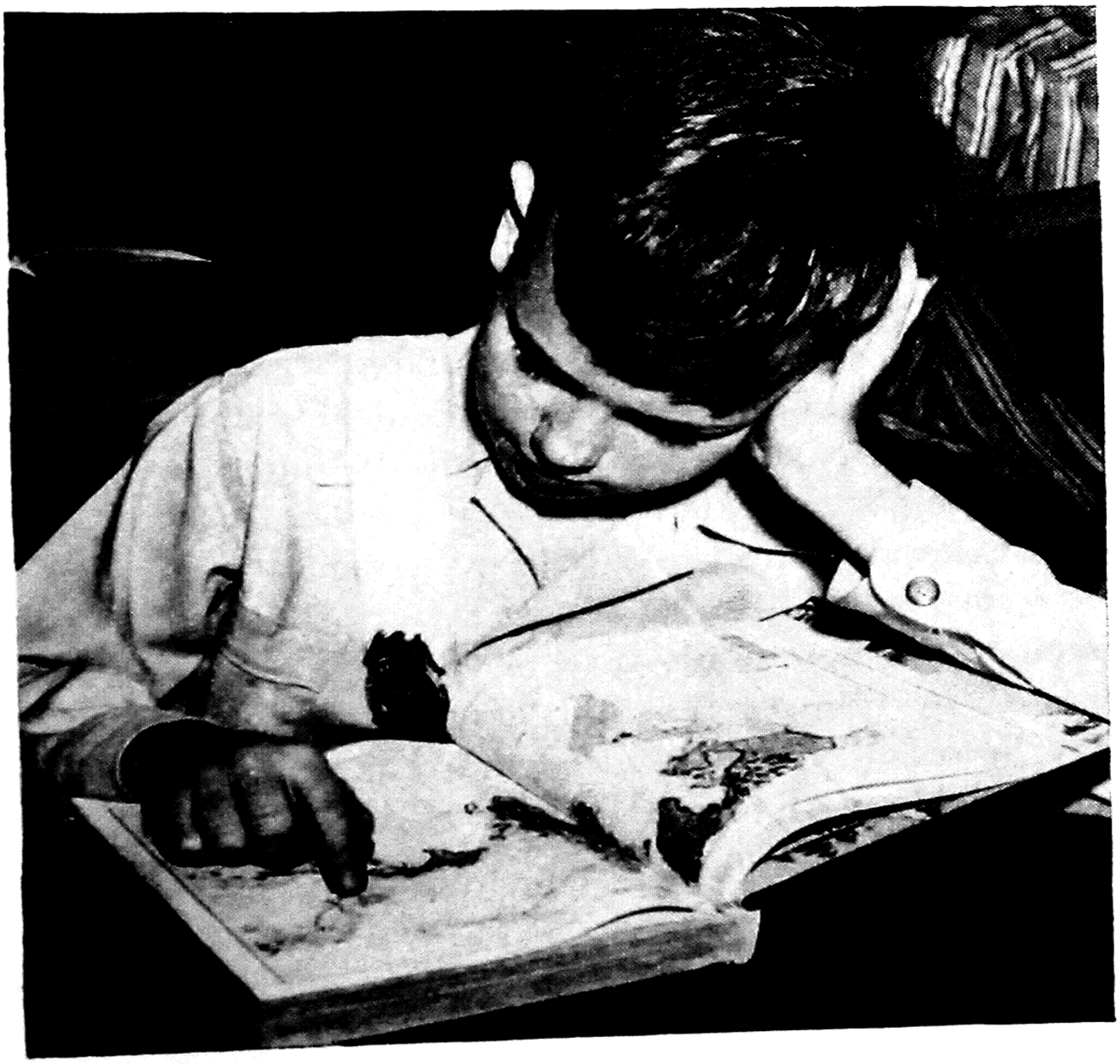
Manila folders and envelopes are commonly used as containers. These are numbered and arranged in filing cases. Larger pictures, charts, diagrams, and graphs may be rolled and housed in drawers or bins. If permanent housing is not available, pasteboard boxes of suitable size will suffice and a shoebox can serve as a card index case.

TEXTBOOK ILLUSTRATIONS

All children like pictures, and books without pictures are considered dull. A classic illustration is the remark of Alice, "What is the use of books without pictures?"

Textbooks for Children. Although the first illustrated textbook was printed in 1658, it is only within the lifetime of those living today that profuse use of pictures has found its way into the books adopted by the schools. A generation ago textbooks were grim and foreboding. A gradual relaxing of the austerity of textbooks was begun with the introduction of *picture books* for beginners. Long before the door to the world of print symbols is unlocked to the child, picture symbols open up a thoughtful and imaginative empire.

This enlivening of texts with color started with decorated ABC blocks, the Mother Goose stories, and popular illustrated fables. The illustrated chart (wall or pedestal type) for the beginners at school was an established institution two generations ago. Today the familiar daily comic strips in the newspapers have gripped the children even before they learn



The textbook illustration is a personalized teaching aid.

COURTESY OF ATLANTA PUBLIC SCHOOLS

to read. Children insist that the comics be read to them and a few children's radio programs for Sunday morning are based on reading the comics to juvenile listeners.

For many years geographies and histories have employed pictures in connection with the context. Too frequently, a common criticism could be applied, namely, that the pictures and the reading context were not closely integrated. No reference was made to the pictures, no questions were based upon them, and most teachers quietly ignored them. Often the pictures were stereotyped and more or less boresome. These criticisms are disappearing as writers and publishers understand the values and uses of illustrations.

Use of Color in Textbooks. The introduction of color in textbook illustrations has added to the general appeal of textbook pictures. Color may not always be necessary or appropriate but its psychological value, its "eye appeal," is conspicuous. The seed grower would not think of sending out a plain black and white catalog. The railway, steamship, oil company, and travel bureau employ color, perhaps even flamboyant color. Textbooks are increasingly using color. Many elementary reader series make extended use of it. A trip through a juvenile library, the children's book section of a department store, a five and ten cent store, or a kindergarten, will present convincing evidence of the abundance of color, design, illustration, and interesting innovations in children's books. Color in pictures must be truthful; otherwise it should not be used.

Pictures Tell the Story. Early in his school career the child becomes acquainted with other peoples, lands, customs, events, and actions. Pictures enable the teacher to build the necessary background for such acquaintance or knowledge. Captions couched in the child's vocabulary add to the meaningfulness of the pictures. When pictures are put in textbooks every child has the same pictures before him for study and he can refer to them repeatedly. Furthermore, authors are making serious efforts to employ the picture as "an integral and vitally important part of the text rather than merely illustrative of it." Take the Thorndike Century Senior Dictionary, for example; in the "Introduction," page xii, Dr. Thorndike says:

> This dictionary contains over 2,300 pictures, diagrams, and maps. All have been carefully selected to serve as essential parts of the definitions. *Because many words are best explained by a picture, the user is urged to study the*

pictures as carefully as he reads the definitions. When possible and feasible, objects such as tools, musical instruments, machinery, weapons, and architectural devices have been shown in use or in operation.[8]

There are some books which need little, if any, illustrative material. Fiction for adults calls for no pictures, but nonfictional reading of a general educational character is usually more palatable if illustrated. At *The New York Times* Book Fair a few years ago, one of the speakers, Fairfax Downey, turned to humorous verse to express a plea for more illustrations in books. The first few lines were:

"Of illustrations now I sing,
A noble art, still flourishing;
And yet today one vainly looks
For pictures in most published books.
You'll find some are upon the jacket,
But when you buy the book and crack it,
The niggard publisher has stinted
And lines of type are all he's printed."[9]

Streamlined books with an abundance of photographs, montages, pictorial statistics, and other illustrations have become popular. It is difficult to say just when they started, but their popularity in and out of school is ample evidence of the fundamental interest of people in pictures. In 1934 the Fox Meadow School published a striking account of life and study in a progressive school: *Willingly to School.* Here the philosophy of a school is set forth in a few words but amply implemented by arresting photography. Caldwell and Bourke-White's book, *You Have Seen Their Faces,* combining words and photography, told a story of the poverty and frustration of the sharecropper of the South.

Pictorial statistics are also becoming popular. They are readable and their message is graphic and potent. The United States Government Printing Office in Washington has been taking the lead in the use of colored charts, diagrams, photographs, and pictorial statistics as complements to textual matter. Pictorial statistics will be discussed more fully in the following chapter.

A series of unusual but little known books employing interesting

[8]Scott, Foresman and Company, Copyright, 1941, by E. L. Thorndike. (Italics, this author.)

[9]Reported in *The New York Times,* November 8, 1936.

techniques in visual aids has been published by the Orthovis Company.[10] In these books an attempt has been made to make flat diagrams on the two-dimensional surface of the page stand out in space with three-dimensional effect. Colored photographic plates of laboratory models and everyday life applications of mathematical principles are included. Each book is accompanied by a pair of colored spectacles called an "orthoscope." Details of the pictures are brought out in an interesting and fascinating manner.

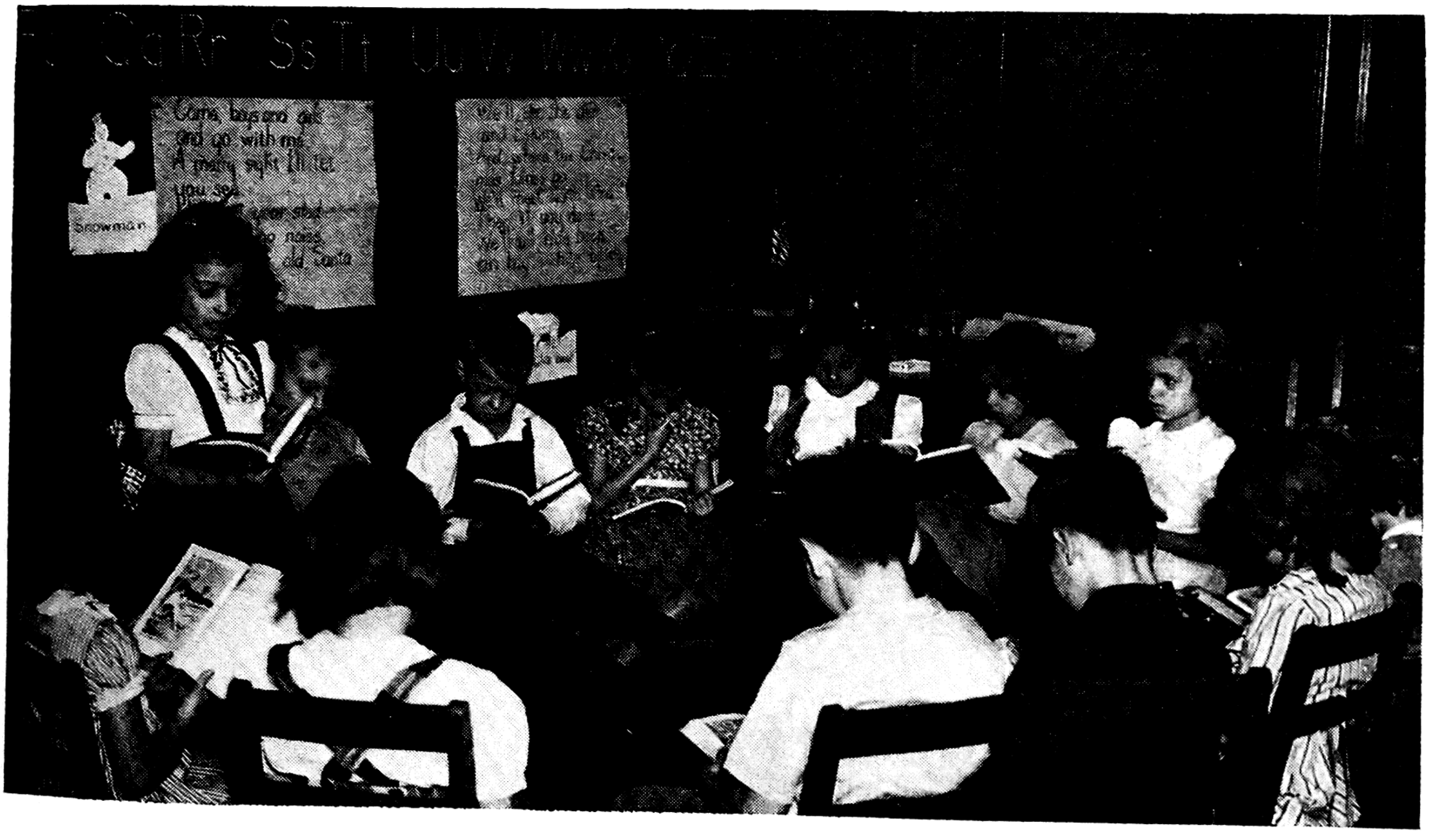
One of the best known and most widely used pictorialized subject-matter texts is the photographic magazine, *Building America.* This magazine was begun in 1935 by the Society for Curriculum Study.[11] Each issue of the magazine presents some question or problem facing the United States, particularly problems occupying the attention of youth. Among the topics which have been presented are Food, Housing, Youth, Movies, Recreation, Power, Chemistry, Men and Machines, Communica-

[10] Breslich, E. R., *Excursion in Mathematics,* 1938, and, *Algebra An Interesting Language,* 1939; Spencer, W. A., *Basic Principles of Analytic Geometry,* Orthovis Company, Chicago, 1939.

[11] *Building America* is published by the Association for Supervision and Curriculum Development of the N.E.A. at 2 West 45th Street, New York City. Subscription price, $2.25 per year (8 issues) or $.40 per single copy.

A good textbook illustration often means the difference between confusion and comprehension for the young pupil.

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tion, Transportation, Social Security, Our Constitution, War or Peace, We Consumers, Safety, and Veterans. *Building America* devotes about one half of its space to photographs and the other half to headings, captions, and running news print. Each unit of study contains from fifty-five to seventy illustrations of such types as photographs, pictograms, cartoons, charts, maps, old prints, diagrams, and facsimiles. Only the "best" photographic material is used. In order to be included a photograph must show people in action as they live, work, or play. These photographs are artistic, clear, and have definite centers of interest. *Building America* is really a new type of contemporary textbook.

Half-tone illustrations, "bleed" photographs, and well-leaded and well-printed books are numerous. A few schoolmen prefer conventional books in matters of width of margin, page size, color of binding, size of illustrations, and format in general. In spite of objections here and there to the effect that costs are higher and that the demonstrable learning value of the books has not been increased, publishers generally are bringing out splendidly printed, illustrated, designed, and bound books.

Summary. Flat pictures are of inestimable value in presenting a full and complete story. Often they are preferable to specimens, models, relics, or original objects which may be too large or too small or too fragile to be handled. Textbook illustrations play a significant role in education. Publishers, authors, and illustrators should select illustrations together and intelligently relate them to the text and to the level of the learner. These criteria might be applied: (1) the illustration should have a central theme and should avoid details which detract; (2) the illustration should be rich in thought content; (3) it should definitely supplement the text and aid in its clarification and interpretation; (4) it should be clear, distinct, and artistic; (5) it should furnish a vicarious experience which corresponds closely to the original situation; and (6) the titles should be meaningful and the sources indicated. Finally, it is not enough just to call attention to the illustration; it should be discussed from the point of view of the text; leading questions should be used to assure that its real value is served.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

A. Pictures

1. Locate and report on an experiment which deals with the learning value of pictures.

2. List the most fruitful sources for pictorial material.
3. Teachers say, "Study the picture." What does a pupil do when he studies a picture? Is the direction of the teacher—"Study the picture"—likely to spoil it for the child? Can we teach children how to *look* at pictures?
4. How can the history teacher, for example, use the illustrations in the text to the greatest advantage?
5. What is the difference between a photograph, a print, and a lithograph? Find illustrations of the three types.
6. Analyze a photographic magazine such as *Building America*. What is its strength? Its weakness? Compare with conventional textbook illustrations.

B. Textbook Illustrations

1. Outline the values of textbook illustrations.
2. Show concretely how they may be used effectively in several actual teaching situations.
3. What should determine the use of color?
4. Develop a set of standards for rating textbook illustrations.
5. Select ten or twelve books for any grade in the elementary school or any high-school subject and make a careful analysis of the illustrations. (1) Are they adequate? (2) Are they an integral part of the book? (3) Do they enhance the teaching and learning potential of the book? (4) What percentage of the book space is devoted to illustrative material and to verbal content?

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Chapter 7

GRAPHICAL VISUAL MATERIALS

The preceding chapter dealt with audio-visual materials of a pictorial character, the emphasis being on flat pictures and textbook illustrations. The present chapter deals with graphical representations of a different nature, but these, too, are materials which give "visible surface representation to a natural scene, object, or incident through the graphic arts." In separating the two chapters, the author has had four reasons in mind: (1) the materials in the former chapter tend to be photographic, whereas those of the present chapter (except globes and possibly maps) tend to be hand-wrought; (2) in the preceding chapter the materials tend to be those bought or made by someone outside the school; those in this chapter, although they may be of the manufactured type, may also be produced in the school by teacher and pupils, or at least collected from inexpensive sources; (3) the materials presented in this chapter are more symbolical than those discussed previously; and (4) there is clearly a

logical difference although psychologically the materials of the two chapters form a framework. Maps and globes are placed in this chapter because they are more graphic than photographic.

DIAGRAMS, SKETCHES, AND DRAWINGS

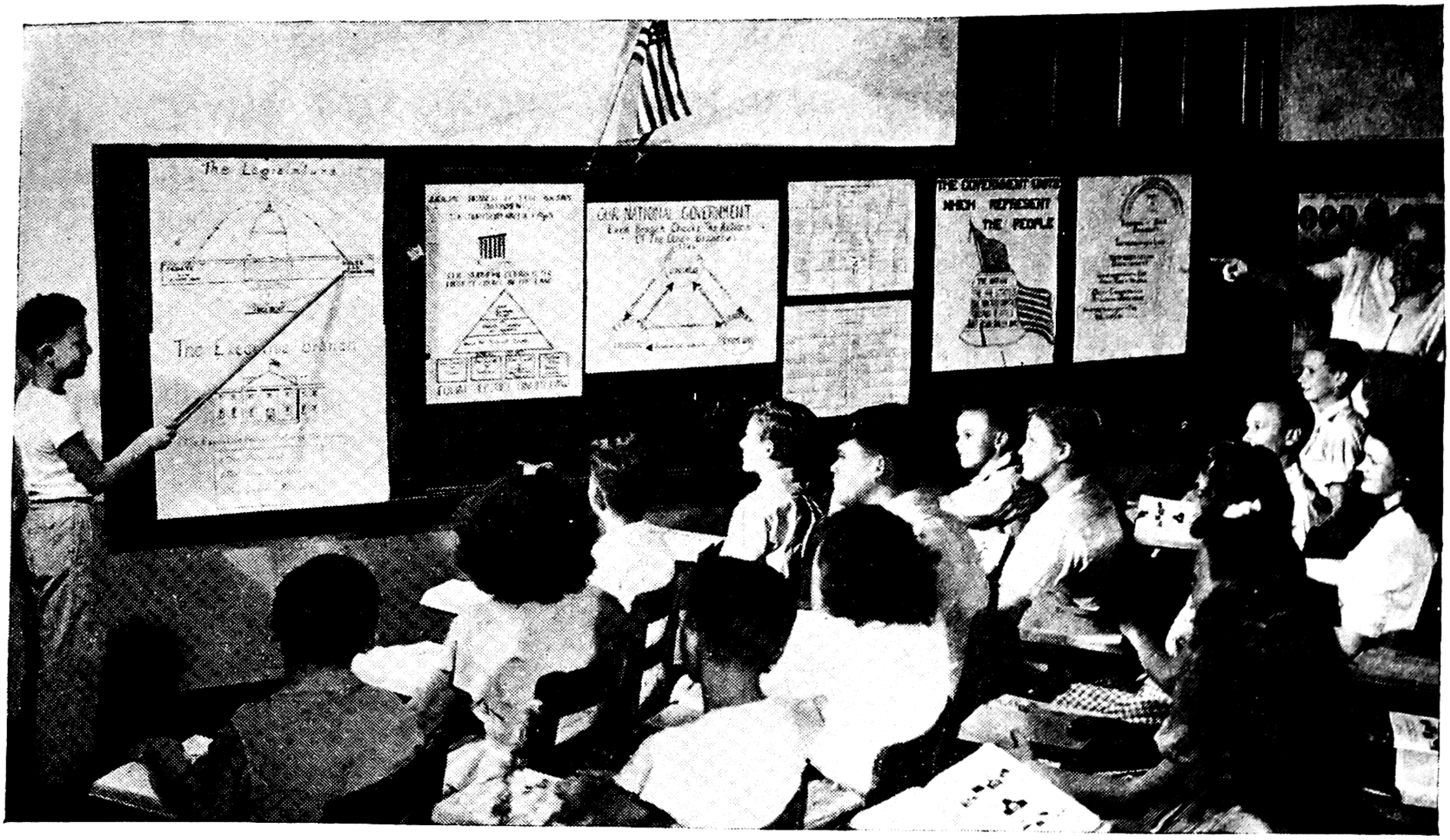
Since the special pedagogical value of these three types of materials is found in their schematic nature, they will be handled as one.

The materials here are hand-wrought, although they may reach the teacher and pupils as photographic reproductions. They serve a unique function as "aids" in the clarification of objects, processes, and phenomena. These materials are often preferable to photographs because they emphasize important factors and minimize or eliminate others. Full attention is thereby focused squarely on the point to be observed without any distracting minutiae. It is noteworthy that a pictorial medium such as *Life* magazine finds it advantageous at times to supplement its photography with sketches and drawings, as in depicting the life of a tree or an appendectomy.

A Plan for Utilization. One of the most abstract and symbolical of all graphic representations, the diagram, is also one of the most useful. In complexity it ranges from a simple sketch to a complicated schematic. It follows, therefore, that teachers need to exercise skill and understanding in order to use it effectively.

Diagrams may be constructed by the teacher, or appropriate ones may be gathered from such sources as newspapers, magazines, and books, to be brought to the classroom to assist in clarifying meaning. Teacher-constructed diagrams and sketches may be prepared in advance of their use on chart cloth or large sheets of paper and then used in the class as intended, or they may be constructed during class periods on the blackboard, slated cloth, chart cloth, or large paper panels, with the class participating. The more complex representations will probably have to be constructed in advance. These representations should be well-made, and after they have served their purpose, should be filed for future use, if the data or processes charted will be repeated in the course the following semester or year.

Whether produced in front of the class on the blackboard or in advance, all diagrams, drawings, and sketches should be errorless, neatly drawn, titled, labeled, explained, and the source indicated, if copied. For



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These junior high school students are helped to understand the structure of their government through wall diagrams.

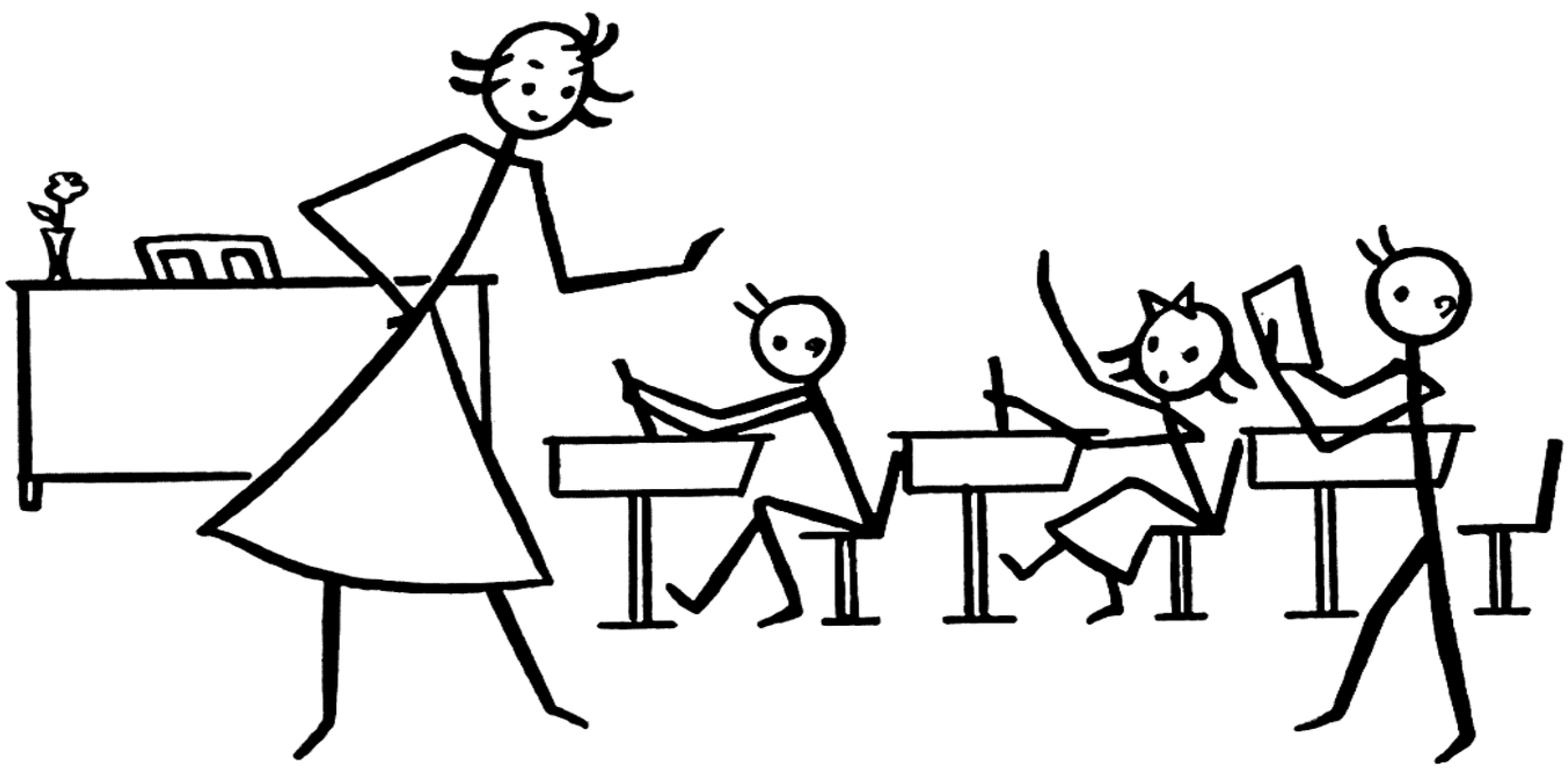
purposes of class discussion they should be large and placed so that the entire group can view them at one time. If the teacher is discussing outlining with the class, he will want to make copious use of the blackboard, showing specifically the structure and details of the outline as he proceeds. A schematic drawing of a complicated mechanism such as the ear or the combustion engine will better be prepared in advance and then used to assist in the clarification and understanding of the subject as it is discussed in class.

Diagrams are extremely helpful in showing relationships and connections. The conventional sentence diagram, in which the graphical form is used as a means to an end, is an ingenious and helpful teaching device. Shades of meaning, modifiers, assisting words or phrases, actions, and the other elements, are all shown in proper relationship. By and large, diagrams developed in class are more pertinent and beneficial than those prepared outside of class. It should also be remarked that individual pupils and class committees should be encouraged to use diagrams and sketches in connection with their work, as in oral reporting or written summaries. Whether done in black and white or in colors, the diagram's function is always to clarify meaning, not to be just a pretty picture.

The Abundance and Variety of Materials. Diagrams, sketches, charts, and graphs are closely related. They may be used in every school subject or teaching unit. They are helpful from primary grades through the university and with informal adult classes. They apply to the teaching of spelling, composition, writing, literature, science, history, geography, mathematics, commerce, industry, journalism, shop work, and other subjects. Blueprints are special diagrams, and, here again, the student must be taught how to read and use them.

In addition to teacher and pupil drawings, commercial companies produce all kinds of diagrams for sale to schools. Charts or arranged diagrams of such things as the eye, ear, cross-section of the flower, blast furnace, solar system, principles of heredity, atomic structure, body organs and functions, and chemical relationships are worthy additions to the permanent visual equipment of any school.

Making Your Own. Teachers should stop leaning on the stereotype, "I can't draw." Some skill in sketching and diagramming should be in-



Stick drawing is easy with a little practice.

cluded in every teacher's know-how. This is not an argument for an artist in every classroom, but for just enough skill to clarify some of the ideas which are a part of the everyday learning experiences. Skill in preparing graphic aids should be included in the teacher preparation curriculum. One does not have to be a cartographer to make classroom maps, nor does one have to be an artist to make sketches, drawings, and diagrams. These devices are so important in trainee education for industrial organizations that Haas and Packer call them "the spark plugs of visual

training because they are easy to make and are effective devices for personnel training."[1] They are equally important, if not more so, to the classroom teacher.

Some skill in sketching, drawing, diagramming, and charting is not difficult to acquire. A little patience plus some practice and a knowledge of a few simple rules are all that is necessary. Stick drawing is easy. Here broken lines represent bodies and limbs. With a little attention to

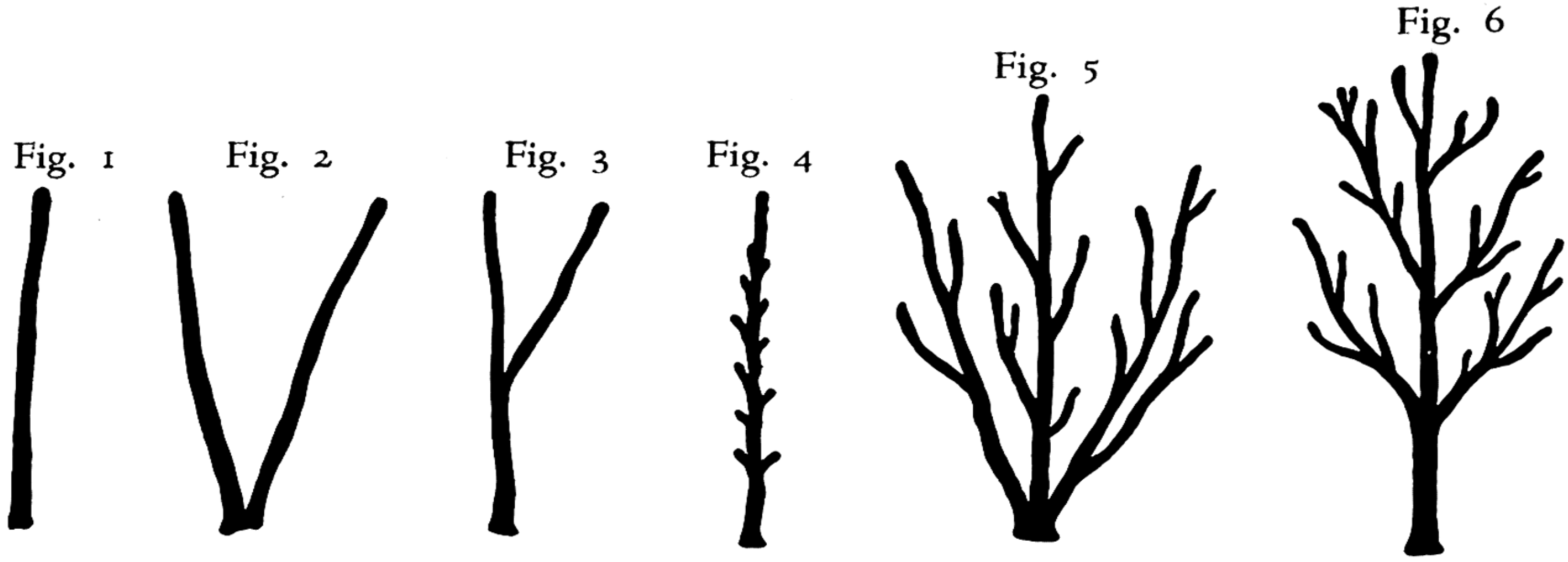


Fig. 1. The simple sentence, rudimentary form[2]
Fig. 2. The compound sentence, rudimentary form
Fig. 3. The complex sentence, rudimentary form
Fig. 4. The simple sentence highly developed
Fig. 5. The compound sentence highly developed
Fig. 6. The complex sentence highly developed

Are these diagrams effective? How much art ability is needed to make diagrams of this type?

preparation of the figures any teacher can sketch. These sketches have the added advantage that they can portray action and motion.

Teachers who feel that they are weak at free-hand sketching can copy sketches and then project them with an opaque or slide projector. Thus the sketch can be enlarged to any size simply by moving the projector near or away from the blackboard or cardboard.

A third method is to enlarge by proportional squares. Divide the small sketch into small squares by drawing light lines with a ruler. Next divide the blackboard or cardboard space into the same number of squares. This

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[1] Haas, K. B., and Packer, H. Q., *Preparation and Use of Visual Aids*, p. 67, Prentice-Hall, Inc., 1946.

[2] Foerster and Steadman, *Writing and Thinking*, Rev. Ed., copyright, 1941, Houghton Mifflin Company.

may be done with a yardstick or by using twine. Rub a light-colored chalk on the twine, draw taut, and snap the twine against the blackboard or paper. Finally, transfer the features from the small sketch to the larger surface square by square.[3]

Diagrams are relatively easier to do than sketches, yet they too call for patience and care in construction. Even a line may be a diagram, but as the line is altered or changes direction the diagram becomes more complicated. In the main, diagrams follow geometrical forms.

CHARTS AND GRAPHS

Charts are defined as information in lists, pictures, tables, or diagrams; also, a map may be considered as a chart in the navigational sense of charting a course. Graphs are lines, diagrams, or pictures arranged to show quantity, development, function, or relationships of factors. Graphs are constructed upon definite mathematical principles; charts are not.

In the discussion of pictorial and graphical media no attempt has been

[3]The technique of enlarging sketches by proportional squares is followed by professional artists who do large murals. It is splendidly illustrated in the motion picture, *The Making of a Mural*. Thomas Hart Benton demonstrates each step from the small free-hand sketch to the completed picture transferred to the walls and ceiling of a large room.



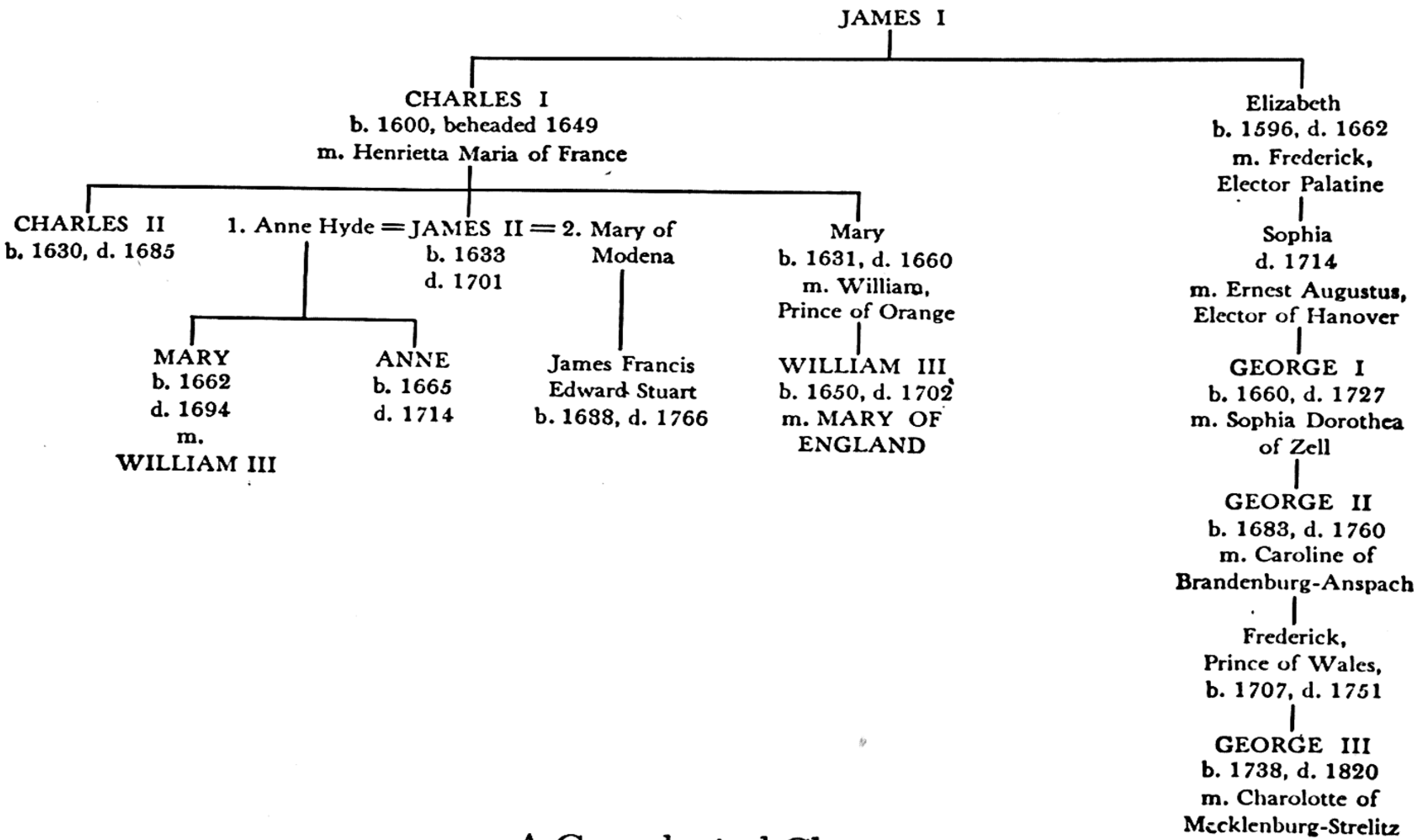
These boys are making a time-line chart relating to their eighth-grade social studies.

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made to separate these materials into distinct, hard and fast categories. They are so closely allied that the use of a loose classification can be justified. A device that is called a diagram may also be termed a chart or a graph under certain conditions.

General Nature of Charts. Charts, so-called, are not new to classrooms. Generations ago, primary rooms were generally equipped with

Sovereigns of England, 1600-1820



A Genealogical Chart

ABC charts—large sheets of heavy paper arranged to be hung from the wall or to be displayed on a tripod. From these charts the teacher taught the alphabet, words, phrases, and sentences. These charts became "group readers," they were economical and practical in a period when individual readers were scarce. In a sense the flash-card, too, is a special and specific type of chart.

Charts are, in a larger sense, not unlike pictures, although they are usually drawn instead of photographed. Pictures are frequently used to embellish the graphic chart, and in such cases the chart and the poster are closely associated. An enlarged picture of the human body showing circulatory or nervous system is called a chart, though it might also be

called a picture or a diagram; it is a graphical illustration designed to provide concepts of location, space, function, and general relationship.

Types of Charts. There is no good nomenclature for charts. At least five separate types exist. They are developmental, pictorial, table, genealogical, and flow. All types are illustrated and briefly explained in the accompanying figures. The developmental or progress chart, often referred to as a frequency graph, is quite commonly used. Pictorial charts are interesting but require considerable time and skill to construct. Table charts are widely used to bring together in compact form a mass of related data. The railroad, bus, and plane timetables are examples of this type of chart. Genealogical charts are extensively used in history textbooks to show dynasties or to show cause and effect. This type of chart has many variants, one of which is the so-called "tree or stream" chart. Flow charts are common in discussions of politics, government, economics, industry, military, and numerous other fields.

Day of Week	Hour	Broadcast Subject	Grade Level
Monday	9:30 A.M.	Afield with Ranger Mac	5–8
	1:30 P.M.	Exploring the News	5–8
Tuesday	9:30 A.M.	Story Book Land	1–3
	1:30 P.M.	Let's Draw	5–8
Wednesday	9:30 A.M.	Let's Find Out	2–4
	10:45 A.M.	Young Experimenters	5–8
	1:30 P.M.	Journeys in Music Land	4–8
Thursday	9:30 A.M.	Music Enjoyment	1–4
	1:30 P.M.	Men of Freedom	5–8
Friday	9:30 A.M.	Rhythm and Games	Kgn.–3
	1:30 P.M.	Book Trails	4–6

The Wisconsin School of the Air Radio Programs Arranged to Illustrate a Table Chart

Importance and Values of Graphs. In the learning and recall of quantitative data and their relationships, graphs assume much importance. They give the reader a vivid mental image of great value in the analysis, interpretation, comparison, and relationships of such data as those involved in size, number, trends, and growth. Graphs not only play an important role in formal school instruction, but graph-reading ability is an essential part of the verbal literacy of the adult. Government bulletins, reports, newspapers, and magazines make extensive use of them. Public

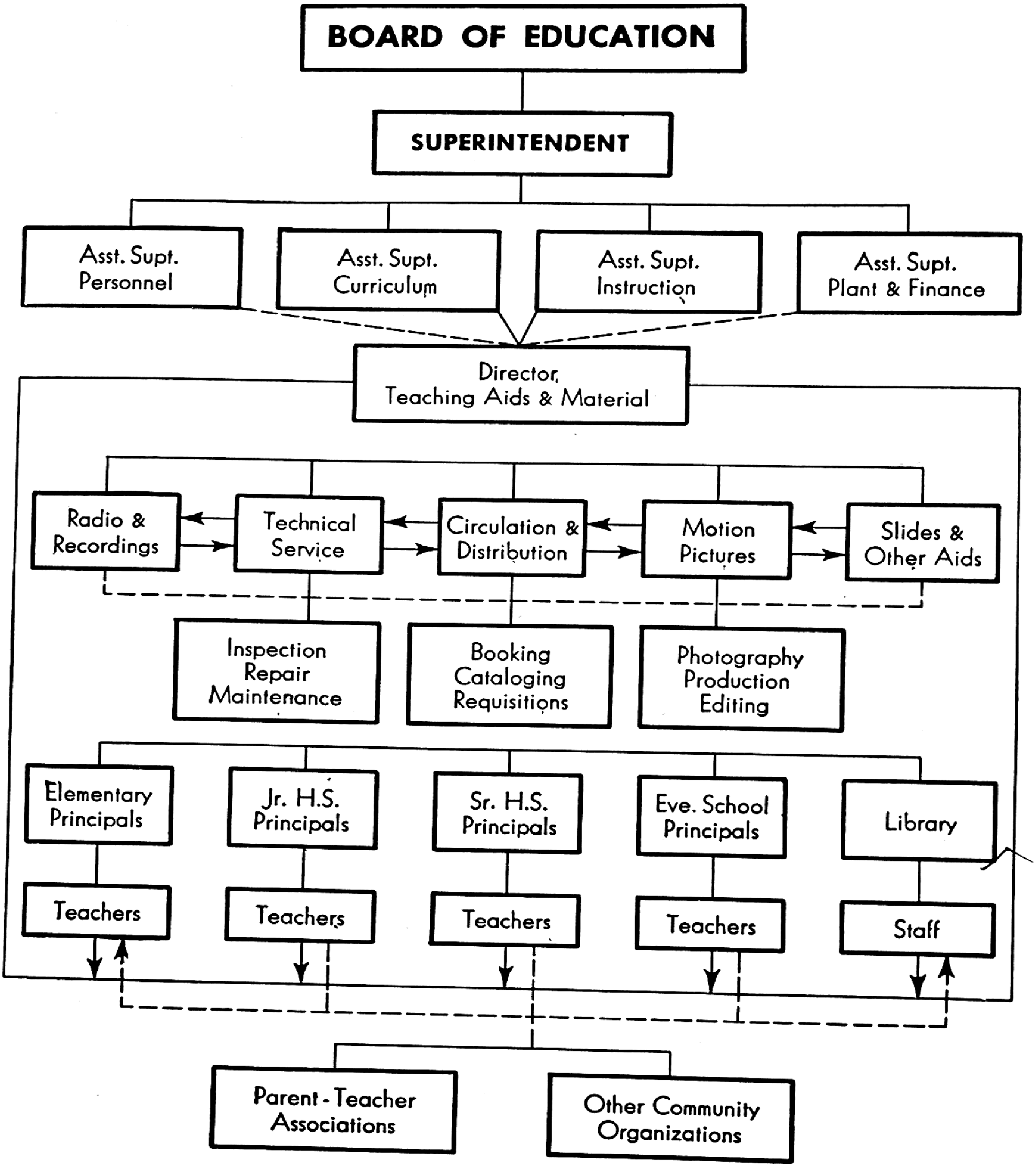
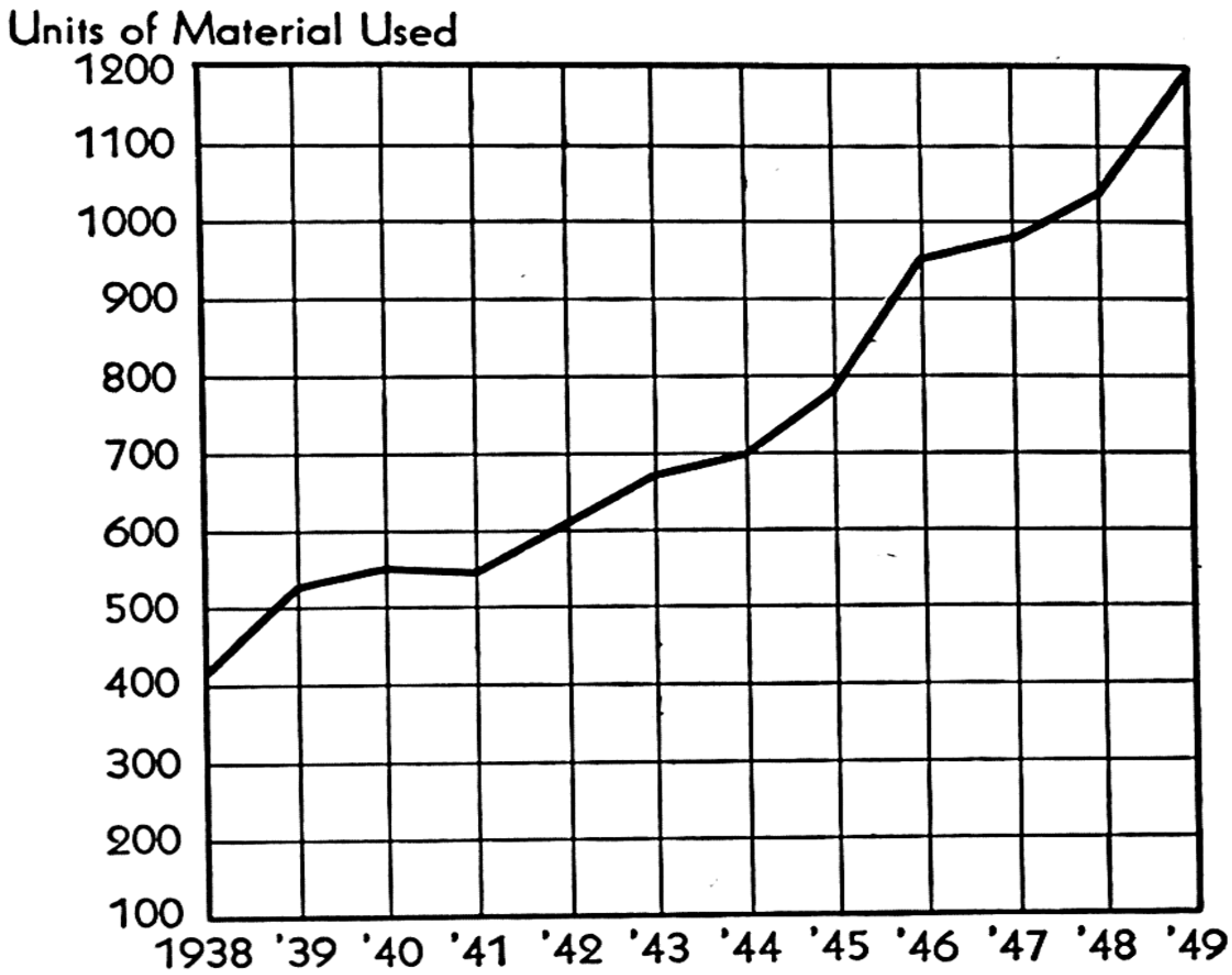


Illustration of a Flow Chart Showing Organization of a Department of Audio-Visual Aids in a City School System

documents are notable for their complexity and involvement; hence, illumination by graphs or any other means is most welcome.

The values of graphs consist chiefly in clear, quick, interesting, brief, and logical presentation of the data at hand.

The chief demand of the average reader is that statistics be clearly presented. Whatever kind of story statistics tell, that story, to be effective, must be told well. Consider a series of school-enrollment figures showing the annual increases for a period of years. They could be more clearly shown by a graph, especially to those individuals who are "eye-minded."



A Frequency or Progress Graph Showing the Number of Audio-Visual Materials Furnished by the A-V Center for Campus Use in an Eastern College

The graph would give a picture of tabular statistics which could be readily grasped. If enrollment figures for a school district had increased, for example, from 83 to 251, one would hesitate before being sure that the latter figure was about three times the former. A properly made graph would tell this at once. When data are more complicated, the graph becomes an even more useful instrument for presenting statistics quickly and simply.

Even when statistical data may be presented clearly and rapidly without graphs, they make very dry reading. To the average person, pages of statistics are anything but interesting. Illustration is needed here even

more than in literature, because in the latter a fascinating narrative often breaks the monotony of the printed page. Many persons are not interested in the stories which statistics have to tell. Anything, therefore, which will enliven them and give the reader the necessary information is helpful.

It should be noted that the points just discussed are closely related to each other. The graphical arrangement makes the data more readable; relationships are clearer; clearness causes the reader to grasp the facts more quickly; this in turn, all other things being equal, makes the facts much more interesting.

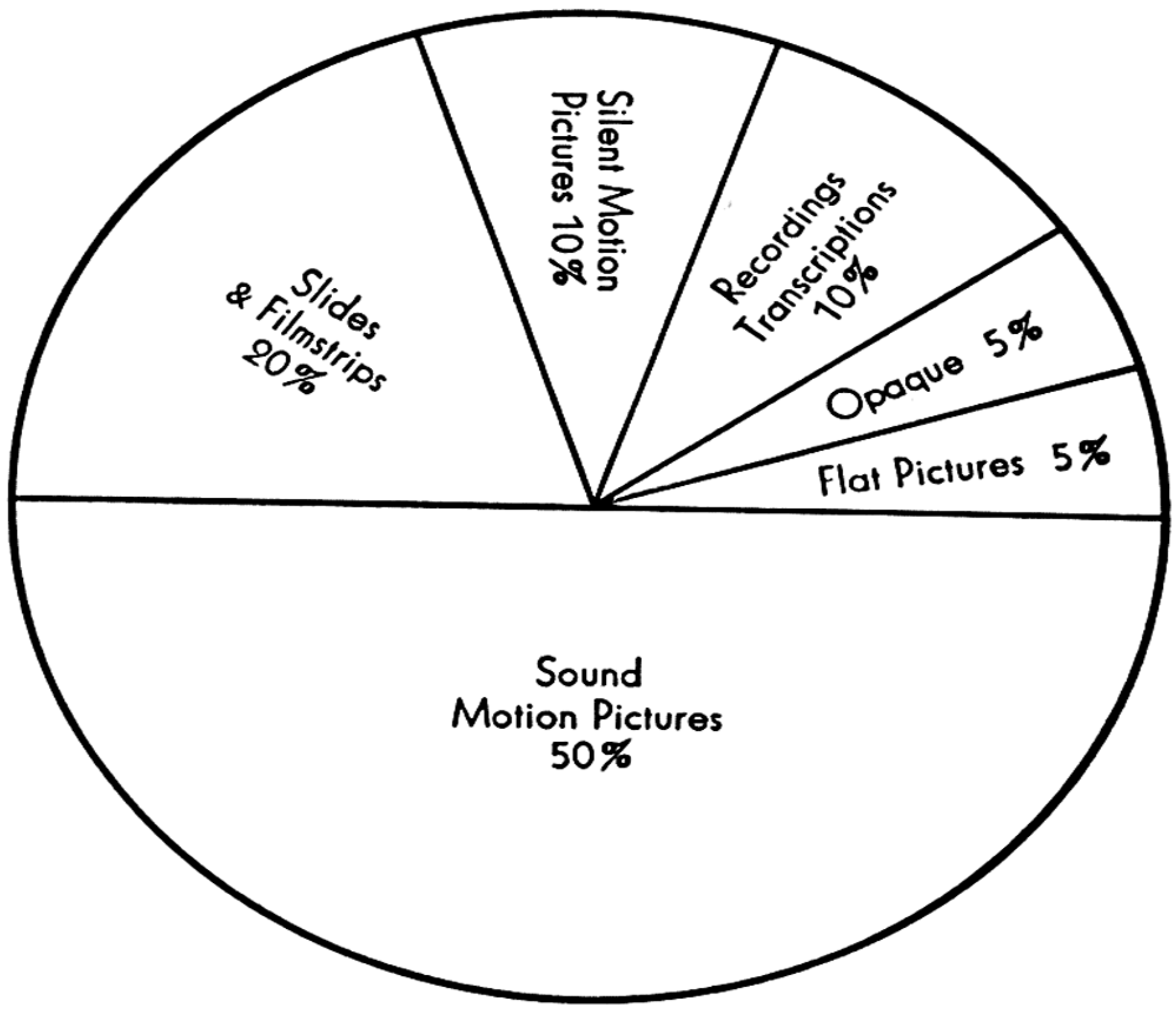
Types of Graphs. Statistical representation allows man's ingenuity much latitude. Nearly every day the number of kinds of graphs grows, yet they can all be classified under five types: line graphs, bar graphs, circle graphs, area graphs, and pictograms or pictorial statistics.

Line graphs are sometimes referred to as the curve graph or the frequency polygon. The line graph is the most abstract as well as the most mathematically correct of all graphs. It is derived by mathematical formula involving the function of two variables. A system of coordinates consisting of an ordinate and an abscissa is arranged with points, values, or magnitudes thereon so that definite mathematical values can easily be located and charted accordingly. This type of graphing is studied in all algebra classes, and continues to be an important mathematical device in the realm of higher mathematics wherever functions of variables are important, as in the strength of materials, stresses and strains, trajectories, and similar problems. This type of graph was illustrated earlier in the chapter under progress charts.

Bar graphs are among the conventional types of graphs. They hold a leading place because of their visual simplicity. They consist of a simple series of vertical or horizontal bars of unequal length but with constant widths. The bars all begin at a base or zero line. The bar graph pictures relative amounts, as inches of rainfall per year, immigrants landing at a certain port per year, production of steel ingots, or similar statistical data. There are relatively few pitfalls in its construction, and the ease with which it is read makes it almost an ideal graphical medium with a host of uses. Illustrations of bar graphs will be found on pages 96–97.

The *segmented circle* or *"pie chart"* is a special type of area graph in which the entire area of the circle is divided into segments representing

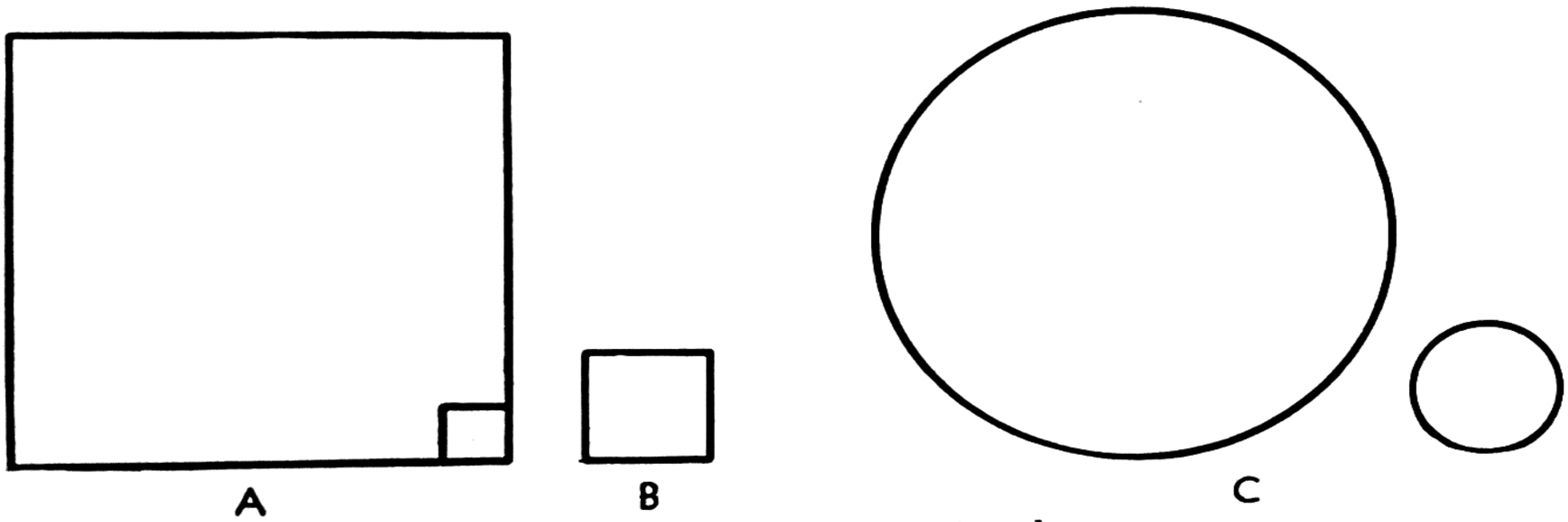
a percentage of the total area. Circle graphs are simple and effective; but since they are based on ratios, figures representing the actual amounts need to be indicated in the segments. These graphs are widely used in such matters as budgets, taxes, production of parts related to a whole, and



Typical Expenditures for Audio-Visual Materials

so forth. The segmented parts are frequently shaded or cross-hatched or colored to enhance effectiveness. Sometimes pictograms are inserted in the segments. A simple graph of this type is illustrated above.

Area Graphs, by means of size or area, show proportions or differences in amounts. It was pointed out in the section above that the "pie chart" is in reality an area graph, but it was treated separately because of its special nature. The true area graphs are usually cubes, squares, rectangles,



Three Types of Area Graphs

open circles, or pictograms. In the main, area graphs have limited value. Their real representation is often obscured and instead of clarifying statistics they may lead to great inaccuracies and confusions. The graphs on page 126 give some idea of the difficulty of making accurate comparisons from area graphs.

Pictorial-statistics graphs, or *pictograms,* are becoming so popular that they all but eclipse the other types in general reading material. Children, in particular, prefer pictorial graphs, in which bars, lines, curves, and shaded areas are replaced by conventionalized drawings of the data themselves. Little black rows of locomotives, men, cows, oil derricks, money bags, or what not give more realism than the older conventional charts in spite of their robotlike form.

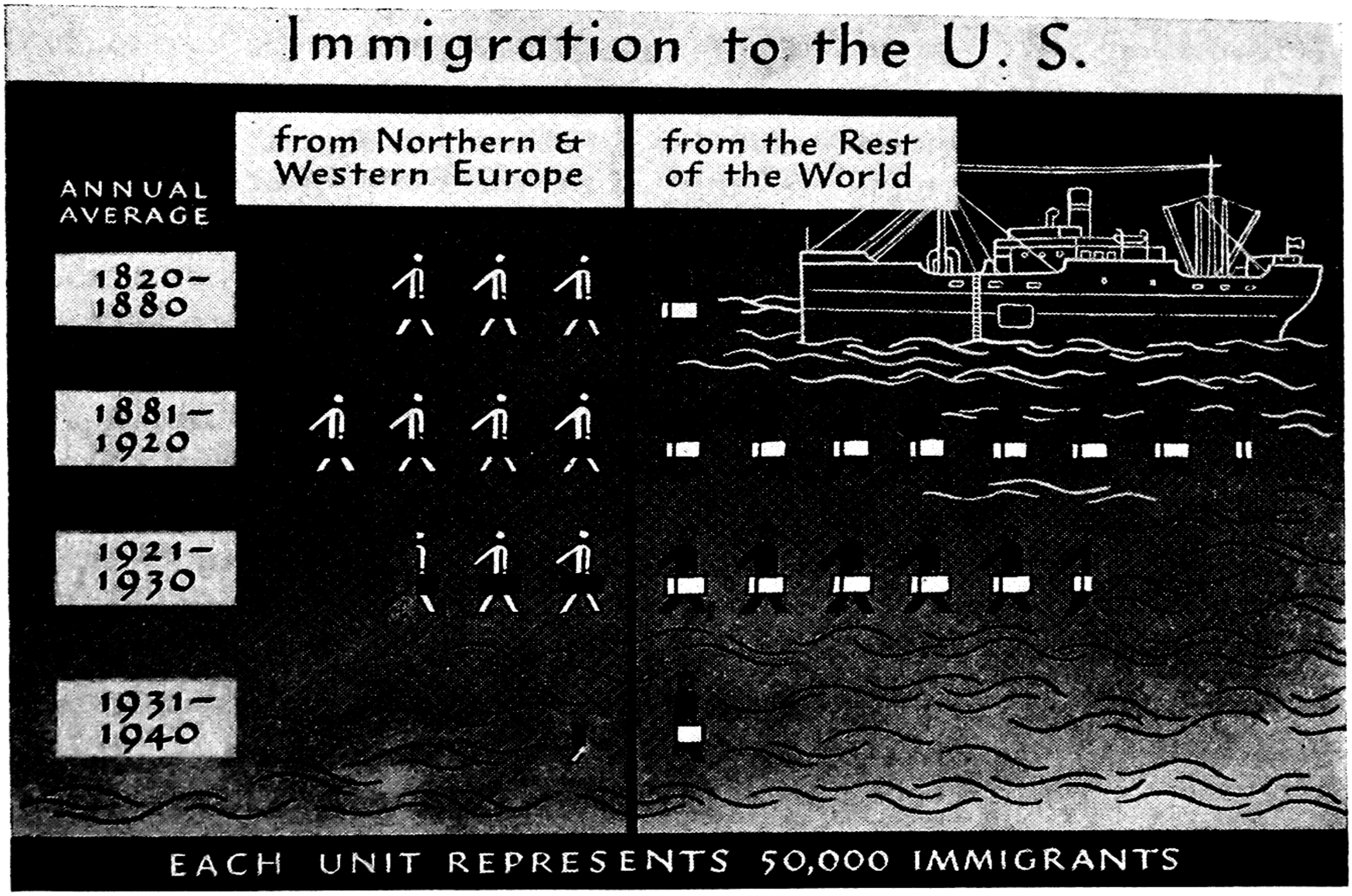
The development of the basic principles and popularization of pictorial statistics are credited to Dr. Otto Neurath who began his work in the late twenties in Vienna. Later he carried on his work at The Hague and then in the United States. Dr. Neurath's objectives were to develop an international picture language or pictorial Esperanto based on a series of simple pictorial symbols called *isotypes.* Each symbol is carefully made by an artist or draftsman and once adopted is never changed. Symbols are simple silhouettes, free from shading and detail, distinctive and readily recognized the world over. Color adds to their variety and attractiveness. It is claimed that these pictographs (1) attract the eye by their unique appearance, (2) arouse curiosity—a desire to know more, (3) satisfy this curiosity by telling a clear, concise story, and (4) are remembered longer than conventional graphs.

Pictorial statistics have become a sort of *Basic English* for visual education. It is a "consistent" method because once a symbol has been adopted it is used wherever the object for which it stands occurs. Thus as a person views an exhibit, he finds a reading of the charts growing easier because the symbols do not change. The symbols constitute a sort of visual dictionary and the method of presentation a kind of grammar, which are characteristic of the method.

Quite naturally serious questions have been raised concerning the value of these pictograms. Some critics have claimed that they amuse but do not educate. Others have claimed that pictograms lead to superficial knowledge because they cannot show accurate measurements, only "round-number impressions."

A number of scientifically controlled experiments have tested these and

other claims. J. W. Wrightstone[4] sought to compare the effectiveness of the conventional graphs and pictorial statistics "in presenting identical quantitative social data when the efficacy is judged by (1) accuracy in locating specific facts for information, (2) accuracy in interpreting or synthesizing facts and trends, (3) immediate recall and recognition of facts, and (4) delayed recall and recognition of facts."



Pictorial statistics help to interpret trends.

Wrightstone's study involved 820 pupils from Grades VII through XII, with the pupils being carefully equated into two groups on the basis of age, educational ability, and social standing. The findings show:

1. Pictorial statistics were more effective in assisting pupils to locate specific facts and information than the usual bar, circle, and line graphs.
2. In interpreting facts and trends, neither type showed any superiority.
3. In immediate recall there was no significant difference.
4. In the delayed recall of facts (twenty-four hours), pictorial statistics were superior, or as Wrightstone says, "In the terms of statistics, the

[4]Wrightstone, J. W., "Conventional Versus Pictorial Graphs," *Progressive Education*, 8: 460–62, October, 1936.

difference in memory of facts between the two modes of presentation shows that the chances are definitely in favor of the pictorial statistics being more effective."

5. Factors measured only incidentally: "The general consensus of opinion was that pictorial statistics generated more interest than the conventional graphs."
6. Finally, Wrightstone concludes, "This does not imply, of course, that pictorial statistics should be used to the exclusion of any other form or method of presenting facts. It does mean, however, that pictorial statistics are effective supplements to the more commonly used means of reporting social facts and information."

Grade Levels and the Teaching of Graphs. Although they receive considerable treatment in junior and senior high school, graphs can be satisfactorily taught and will have many uses much earlier. Teachers of the third, fourth, and fifth grades often teach simple graphs in connection with arithmetic, social studies, English, or some other study. Simple charts to show how many or what books certain children have read are in reality graphs. Colored strips of paper pasted above each other graphically show the books read. Nearly every geography or history textbook makes elaborate use of graphs. Thermometer charts or clock or coin diagrams are simple types of this pictorial device.

Certain types of graphs, such as the segmented circle graph involving greater abstraction, cannot be easily understood before junior and senior high school. Any graph which is difficult to read or has to be pondered over is worthless.

Accuracy in Graphs. Graphs can effectively give the student vivid pictures of comparative data, but they can also be deceptive. Therefore, the teacher has a responsibility for careful teaching and clear understanding in the matter of graphs. It has been said that almost anything can be proved by statistics. The same is true of graphs. Truthfulness and accuracy must be stressed.

MAPS AND GLOBES

One of the oldest and most widely used classroom aids is the map. Teachers and laymen alike unquestionably rate maps high in educational value on any list of visual materials. Now, as never before, Americans are "map and globe conscious." An N.E.A. survey of city school systems, in 1946, showed maps and globes to be the leading visual aid in

terms of quantity owned by the schools. Ninety-eight per cent of the schools surveyed had maps and globes in some quantity.[5]

Purposes of Maps. To many teachers, the map is a picture of the earth in miniature, a picture on which places can be located. This concept of the map is only a half-truth because a map is more complex than a picture; in fact, it is a conventionalized graph built upon a mathematical base and involving a knowledge of many symbols and much data. The specific functions of maps are: (1) to enable students to understand both relative and exact positions of political units, land masses, and water areas, (2) to furnish information concerning areas, distances, directions, shapes, sizes and relationships, (3) to provide orientation and a means of visualizing large and remote areas, (4) to clarify descriptive material, (5) to provide a visual basis for comparisons and contrasts, (6) to provide a means for regional synthesis, (7) to provide interest and stimulation to learn more about people, geographical influences, and places, (8) to enable students to trace movements, migrations, and distributions of

[5] National Education Association, *Audio-Visual Education in City-School Systems*, Research Bulletin, vol. 24, no. 4, p. 158. The Association, Washington, D. C., December, 1946.



The son of a South American consul explains the problems of his country to a classmate, with the aid of a map of that continent.

COURTESY OF ST. LOUIS PUBLIC SCHOOLS

peoples, vegetation, animal life, and cultures, (9) to serve as one method of study for review, (10) to provide an objective "test means" for certain types of measurement, (11) to furnish a means for self-expression in project and unit study.

Throughout all of the above purposes one must recognize the fact that maps and globes present information and present it in clear meaningful ways. Vague notions of locations and distances of local, state, national, and globular communities are replaced by clear, economical, and systematic concepts. How they are to be *taught* and *used in teaching* will be considered next.

Old and New Uses of Maps. The purposes just discussed imply newer uses of these visual materials. There was a time when students copied and traced maps, an exercise which probably served little more than to amuse pupils or to provide them with busy work. Geography, too, was taught as formal place location and terminological classification. The data learned were cold, isolated facts without functional relation to life and culture. Now, beginning in the early grades, children are taught maps because of one or more of the purposes already listed.

Many of the older classrooms were devoid of maps, and often those maps which were there were relatively useless. The political map with its Joseph's coat of many contrasting colors soon becomes obsolete in this world of rapidly changing political and economic events. Maps which emphasize the relatively permanent facts of geography, facts which influence the use made of the earth's surface and dictate the economic activities of people, are now receiving more consideration. Modern needs must be served by modern maps. Geography forces men's lives into sets and molds. Thinking is global. Classroom materials must meet the challenge of providing teachers and children with concepts, attitudes, skills, and appreciations commensurate with these changes. Maps must answer pupils' questions about the earth, locations, and people. They are not courses or subject matter to be taught as such.

Map Systems. For two thousand years geographers and cartographers have struggled to make maps that would be accurate, true to our knowledge of the nature of the earth, and readable in detail. The globe, since it approximates the general shape of the earth, has been the most accurate representation. The two-dimensional flat map has presented problems of many kinds.

One of the earliest attempts to picture the world was made by Crates, a Greek teacher of geography and grammar, 200 years B.C. He devised his famous Orb of Dominion which he divided into four equal parts. On one part he placed the home of the human race of his time; the other three parts were unknown. (Incidentally, one part he labeled the Antipodes.)

During the Renaissance, the fertile mind of Leonardo Da Vinci devised the "Mappemonde" from a Portuguese globe. Da Vinci divided the globe into eight parts, thus approaching the idea of the modern "Butterfly" or "Global Gore" map. Both Crates and Da Vinci tried to divide the globe up into manageable parts which could be spread out on a flat surface.

A generation after Leonardo Da Vinci, Mercator invented his "projection," which was a chart or diagram for mariners. Unfortunately the idea became fixed that the world map could be square. Mercator's map, called a cylindrical projection, is based upon parallel meridians; the exaggerations north and south are adjusted to correspond to the east-west exaggeration in each latitude. At or near the equator this device proved reasonably accurate and useful; but the farther areas were from the equator, the greater their distortion. Thus, land areas near the poles would appear larger than bodies at the equator, although in reality these areas might be much smaller; Greenland, for example, appears larger than South America, whereas in reality it is only one ninth the area of the continent of South America. It must be remembered, however, that the Mercator maps and charts were not originated for school use. They were extremely useful in navigation and astronomy and were an improvement over Ptolemian cartography.

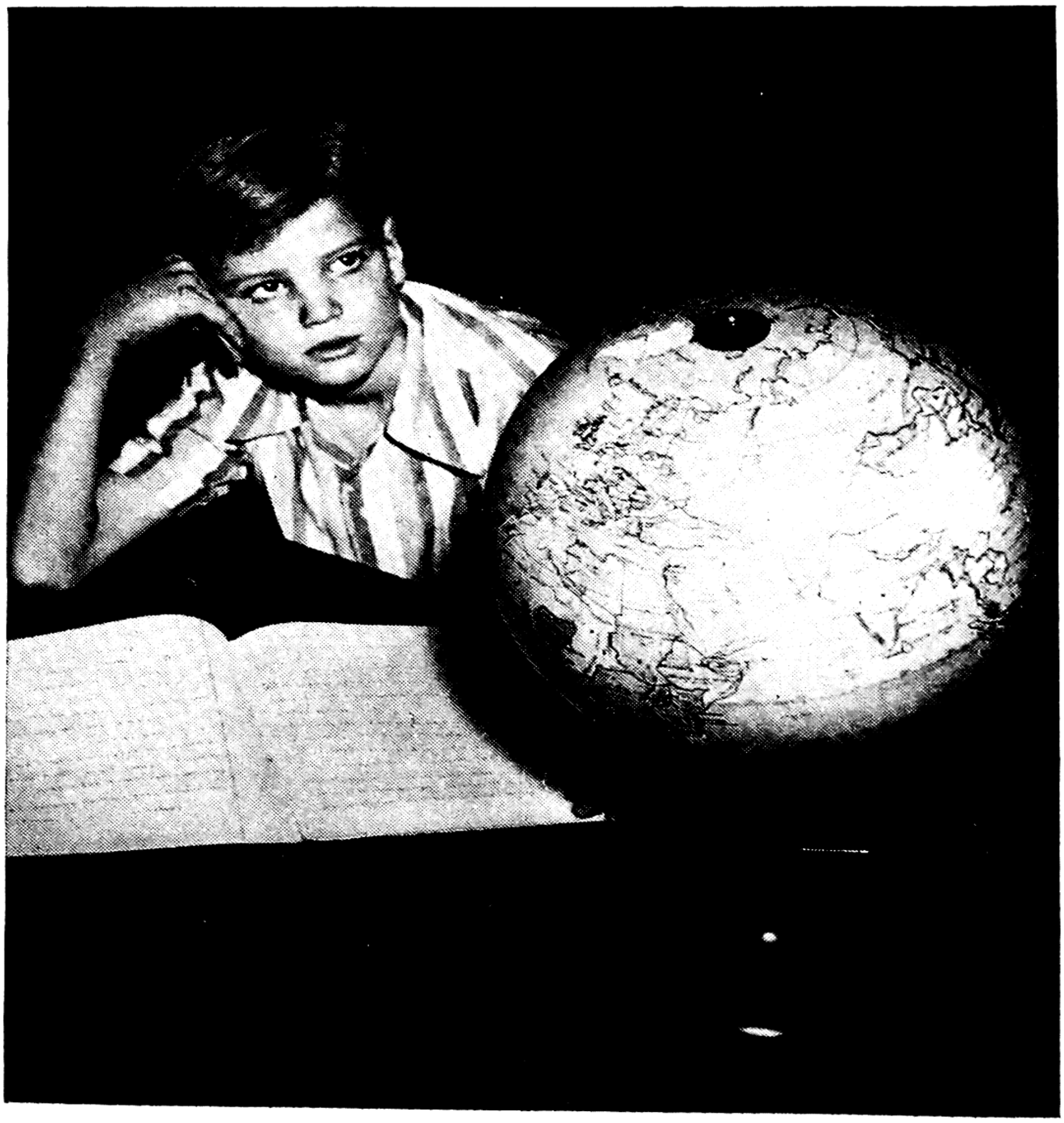
Other projections, later than Mercator's, are the conic, polyconic, sinusoidal, and Lambert's Azimuthal. These projections are all somewhat better than the Mercator and are excellent for areas of continental size or less.

More recent projections are Mollweide's Homolographic Projection, an equal-area projection showing the whole world on one map without distortion of areas. Its advantages are: (1) the whole world is on a single map; (2) the projection makes for no distortion of areas as in the Mercator map; and (3) all parallels and mid-meridians are straight lines. The single chief disadvantage is that areas mapped near the outer border have great angular distortion.

Two more recent projections of the equal-area type have been made by Professor J. Paul Goode of the University of Chicago. They are Goode's

Interrupted Homolographic Projection and Goode's Homolosine Projection. These projections are interrupted or segmented, and as such will cause trouble for pupils unless they are carefully taught, but their superiority compensates for difficulty. The Interrupted Homolographic is really a modification of Mollweide's work and corrects any existing distortion at high latitudes and at outer edges. To do this, Goode arbitrarily drew mid-meridians from one pole to the equator with each of the five continents centered on a mid-meridian so as to give the entire arrangement its best form; thus, North America is centered on the meridian at 100 degrees west, South America 60 degrees west, Africa 20 degrees east, Eurasia 60 degrees east, and Australia 150 degrees east.

The Homolosine projection is also interrupted, and has the added feature of combining two major projections on one map—the sinusoidal is used to 40 degrees north and south of the equator, and the homolographic is employed for the high latitudes beyond 40 degrees. It is generally conceded to be an excellent equal-area projection. Some critics complain about the rather unconventional appearances of both of the Goode projections.



As the world "grows smaller," the globe becomes of greater importance as a teaching aid.

COURTESY OF ATLANTA PUBLIC SCHOOLS

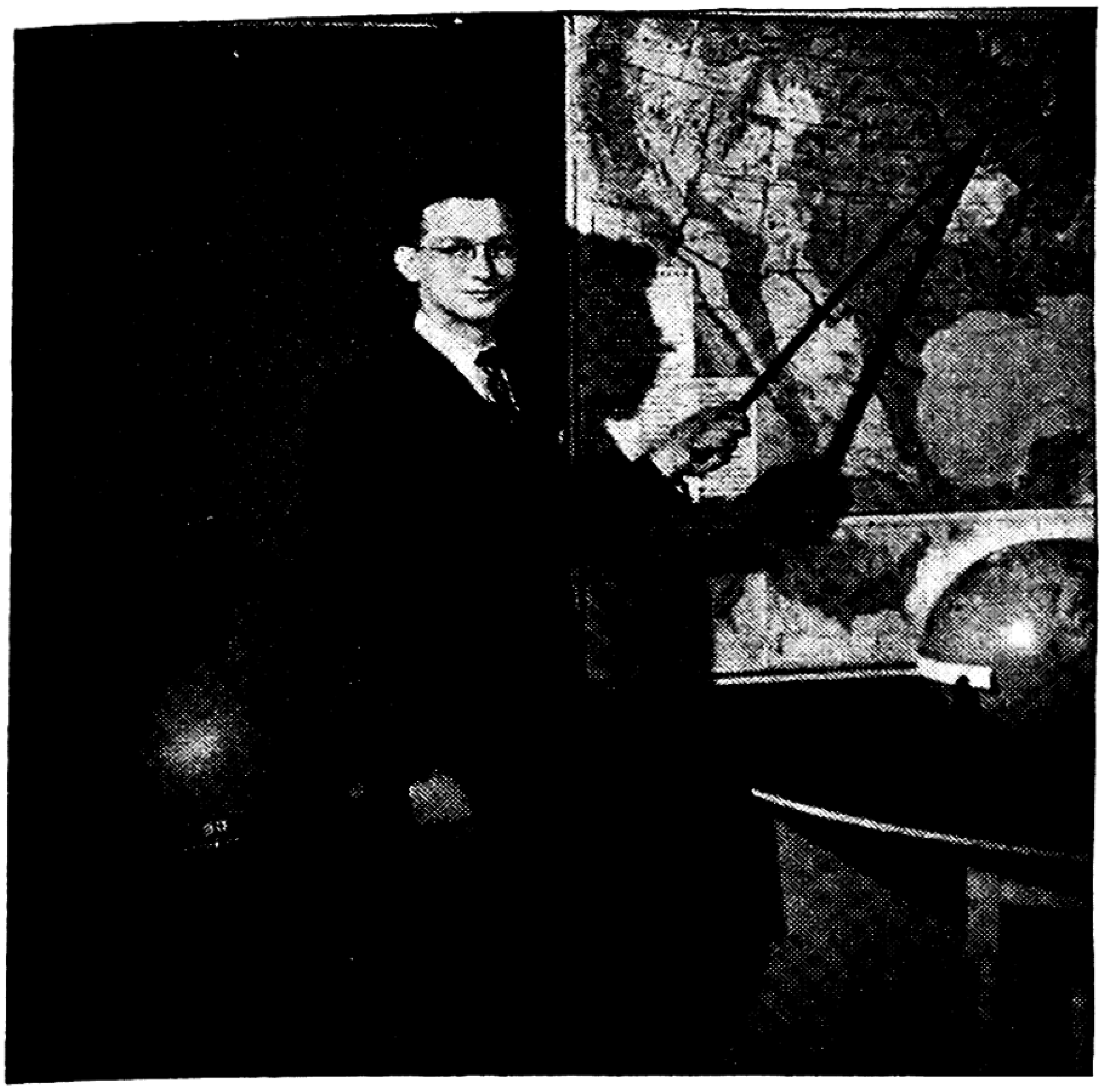
The Atlas. The atlas is more than a book of maps. It is actually a geographical encyclopedia with maps, dictionary of geographical names, names of places, mountains, water bodies, data on population, statistics of many kinds, historical incidents, and similar information. The name atlas is given to this collection of maps, charts, pictures, and data because in the first ones which were published the figure of Atlas supporting the globe appeared on the title page. Formerly, atlases soon became obsolete, but recent developments enable the publishers to furnish periodic supplements, thereby keeping them up-to-date. Until recent years most atlases were published in Germany or England.

The Globe. The globe is an artificial sphere made of metal, plaster, paper, pasteboard, or a plastic, on the surface of which are drawn maps of the land and water bodies of the earth or a representation of the heavens. The former is called a terrestrial globe and the latter a celestial globe. Schools make much more use of the terrestrial globe, and this is the globe to which attention is directed at this time.

Globes are usually mounted on a pedestal, are cradled, or are suspended from the ceiling. They can be had in varying diameters, but educators generally believe that sizes below a sixteen-inch diameter are not satisfactory. The globe turns on a wire or spindle which represents the earth's axis; the extremities represent the poles. Latitudes and meridians are marked off on the surface.

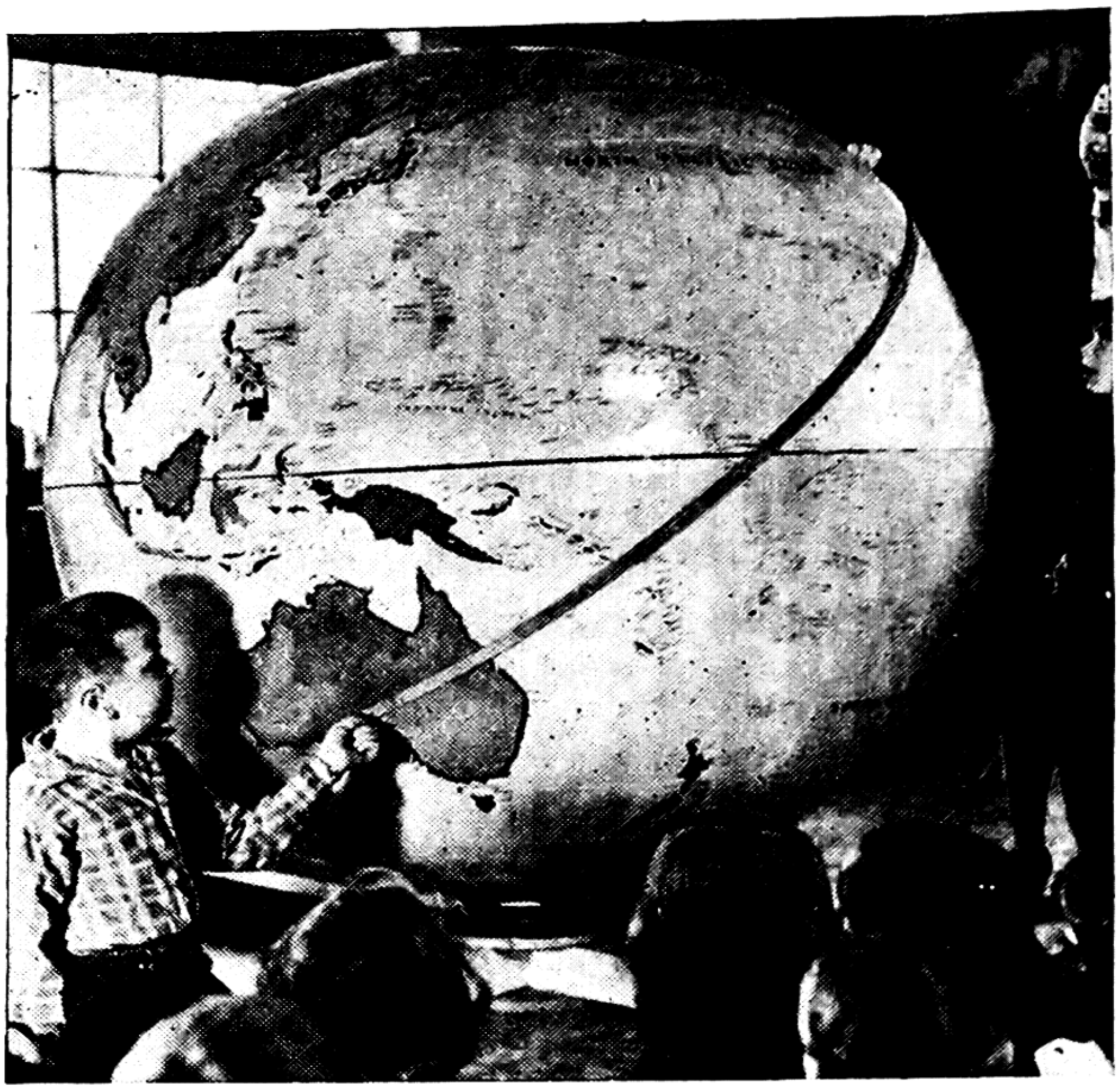
As a means of representing and locating places and distances on the earth's surface, the globe is superior to the flat map. Relationship between places in matters of size, direction, and position are exact because the earth's curvature is approximated by the curvature of the globe. In marine navigation, this is not so important, but in aviation navigation, it is extremely important. Furthermore, the globe is far more valuable than the map in teaching the earth's movements with consequent knowledge of time and seasons. Latitude and longitude and other conventional geographical markings are more easily taught and understood. It is essential that teachers have access to a good quality globe; in fact, they should have two globes—one a physical-political and one a slated-outline.

Globes are not without some disadvantages, although the advantages far outweigh the disadvantages. Since the globe is small, the representations on its surface are in miniature and many details are omitted altogether. Unless properly taught, children may experience difficulty



COURTESY OF THE STATE UNIVERSITY OF IOWA

The globe and the flat map should be used together.



COURTESY OF GLENCOE, ILLINOIS, PUBLIC SCHOOLS

These first-graders are using a 6-foot school-made globe.

in switching from a flat map to a globe and back again. (In the past so much of the geography taught in the schools was taught piecemeal that the flat map seemed to serve appropriately enough. Now that people have become world-minded, the globe is indispensable above the primary grades.

Types of Maps. The three general classifications of maps are: (a) globe, (b) relief, and (c) flat surface. Globes have already been discussed above as a very special type of map. Discussions of relief and flat surface maps follow.

Relief Maps. Insofar as reality and abstractness are concerned, the relief map is intermediate between the globe and the two-dimensional flat map. The purpose of the relief map is to bring out the inequalities in elevations of the earth's surface. Of course, the relief globe will combine the main purposes both of the globe and the relief map, yet the relief globe is not altogether satisfactory, because it is too small to show the natural irregularities of the earth's surface. Relief maps are confined to a smaller area, as a continent, a nation, a state, or a locality, and by exaggeration the valleys and elevations stand out in bold relief. Elevations are built up either to exact scale or an approximation.

Maps of the relief type, being three-dimensional, can be highly realistic. They have great value in allowing exercise of the tactile sense. They

should, therefore, be made by pupils wherever possible. Pupils handicapped through loss of sight profit much by this type of map. This map is in actuality a model or "mock-up."

Relief maps have wide use in commerce and industry. Displays and exhibits are common. Planning commissions of parks, cities, counties, and states use them liberally; even land development companies find them helpful.

Construction materials for relief maps consist of plaster, clay, sand, modeling wax, pressed paper board, or laminated wood. Experts make a business of constructing relief maps commercially, building them to exact scale. School children can use many of the same materials, and their models though not made with the same accuracy, should show relative values. The objectives and outcomes desired will determine the amount of time to be given to such a project and the degree of accuracy necessary. A cheap method of making school relief maps is to use salt, flour, and water, or soaked paper pulp. These maps can be enhanced by color which also causes the relief to stand out more boldly.

Two-Dimensional Flat Maps. All flat maps are highly symbolical and abstract. They have been a part of the available school equipment for many years, although some schools have few maps and sometimes those which they have are of poor quality or lack sufficient recency to be of much value. To many school boards, "a map is a map"—which explains why they fail to provide up-to-date or different kinds of maps. Lack of discrimination in selecting maps is common.

Four types of flat maps will be discussed: physical-political, relief, pictorial, and miscellaneous.

1. *Physical-political* maps are the type usually found on the walls of the classroom. This type of map is customarily laid out along political boundaries superimposed upon geographical data such as mountains, deserts, rivers and other water bodies. These maps may have so much detail that they are difficult to read and understand. Maps of this type are commonly hung from the wall and are frequently referred to as "wall maps."

A variation of the physical-political map is the outline or skeleton map which gives a bare outline and which can be developed in innumerable ways by the pupils as their study progresses. Outline maps may be scored on the blackboard or they may be purchased on slated paper or cloth.

In either case their uses are legion, and they will serve class after class for year after year. Political boundaries are constantly in a state of flux and maps with printed names and fixed colors are soon outmoded. Along with the wall outline map which is essentially a group instructional device, there are small outline maps printed on paper for individual pupil use. They are inexpensive, but valuable.

Machine-projected maps provide a close tie-up with other types of visual equipment. Lantern slides of maps of special areas may be purchased or made by hand. These slides are then projected onto the blackboard and outlined in chalk for individual or class use, and the lantern then turned off. The projection might be on a sheet of large paper to be used for study and development. Also, the projection can be made on the wall and discussed with the lantern burning, although this technique may conceivably run into difficulties unless the lantern is equipped with a blower and a good cooling system. Another projected map can be obtained by using the opaque projector. With this device any map from a book, pamphlet, or paper, can be projected to any size without the trouble of providing a slide. Projected maps are economical and can be kept current at little expense. They are more likely to be tailored to specific needs than the fixed and more expensive wall maps. It is not recommended, however, that teachers use projected maps to displace wall maps completely.

2. *Relief maps* have already been discussed, but as three-dimensional maps. The relief map may be simulated on a flat surface. This is done by photography, coloring, shading, or by use of other standardized conventions.

Certain patented processes have been perfected so that by using a high-grade lens a relief model is photographed in a manner to give the illusion of the third dimension. A similar type map of a limited area can be produced by aerial photography.

In recent years there has been great interest in relief or topographic maps by nations all over the world. In Europe and Japan the inspiration sprang from such military considerations as facilities and handicaps to moving troops and equipment, digging of trenches, and fortifications. In the United States the main object has been economic development—canals, river improvement, flood control, irrigation, swamp reclamation and other projects. Geodetic and geological surveys make elaborate use of topographic maps.

Relief on flat maps is ordinarily shown by shading, color, hachure, and

contour lines. Frequently these methods are employed in combination as shading and color, or shading and hachure, or hachure and contour. Hachure has been most highly developed by map makers in Switzerland, Germany, and France. This method consists of a type of shading by lines. The lines are short and are drawn down the slope to show in which direction the water will flow. Steepness of slope is shown by the proximity of the lines. Contour maps are used extensively in the United States and in Japan. Contours appear as curved lines, close together or far apart, connecting all points of equal elevation on the map. They tend to make a series of irregular concentric circles. Color is used in connection with layering or "hypsometric coloring," a system that is used for the International Map of the World. This is the system in most general favor for textbooks and wall maps in American schoolrooms. This system has adopted the colors of blue for the sea, with green, yellow, brown, and red for ascending elevations above sea level.

3. *Pictorial-statistical maps* make use of pictures, drawings, photographs, dots, isotypes, and similar figures to develop realistic associations between regions and population, crops, products, or ethnics. A pictorial map need not necessarily be statistical, but it usually is. Just as in the case of pictorial graphs, many educators are not convinced of great worth in this type of map. It is often pointed out that the pictures on the map are not proportionate in size to the map itself. Thus, the pupils may acquire a disproportionate or inaccurate concept. Another objection is based on the fact that the picturization may show one thing only, as a coffee bag for Brazil, whereas there are many products which should be connected in the pupils' minds with Brazil. Research is needed to clarify the value of pictorial maps. In the meantime, teachers using them should consistently have the pupils alerted for omissions, generalities, and errors, if and when they occur.

4. There are many other types of maps of a miscellaneous character. One of the commonest is the road map which is so useful that it is almost indispensable. Other miscellaneous maps may indicate temperature, climate, rainfall, soil, vegetation, religious status, population, historical, campaign, invasion, city, literary, music. All of these maps serve the same purpose, namely, to connect geographical location with a thing, event, phenomenon, or circumstance. In the summer of 1946 the "Fotocast Map" made its appearance. It is used in connection with weather forecasting by daily newspapers.



A Pictoral Map of South America

What the War Taught Us About Maps. Geography has never been accorded the place of importance in the United States that it has in Japan and certain European countries. During World War II, geography and geographical knowledge carried a premium. With troops all over the globe, people at home, young and old, collected and hoarded maps as never before. Soldiers and sailors studied them in their basic training and

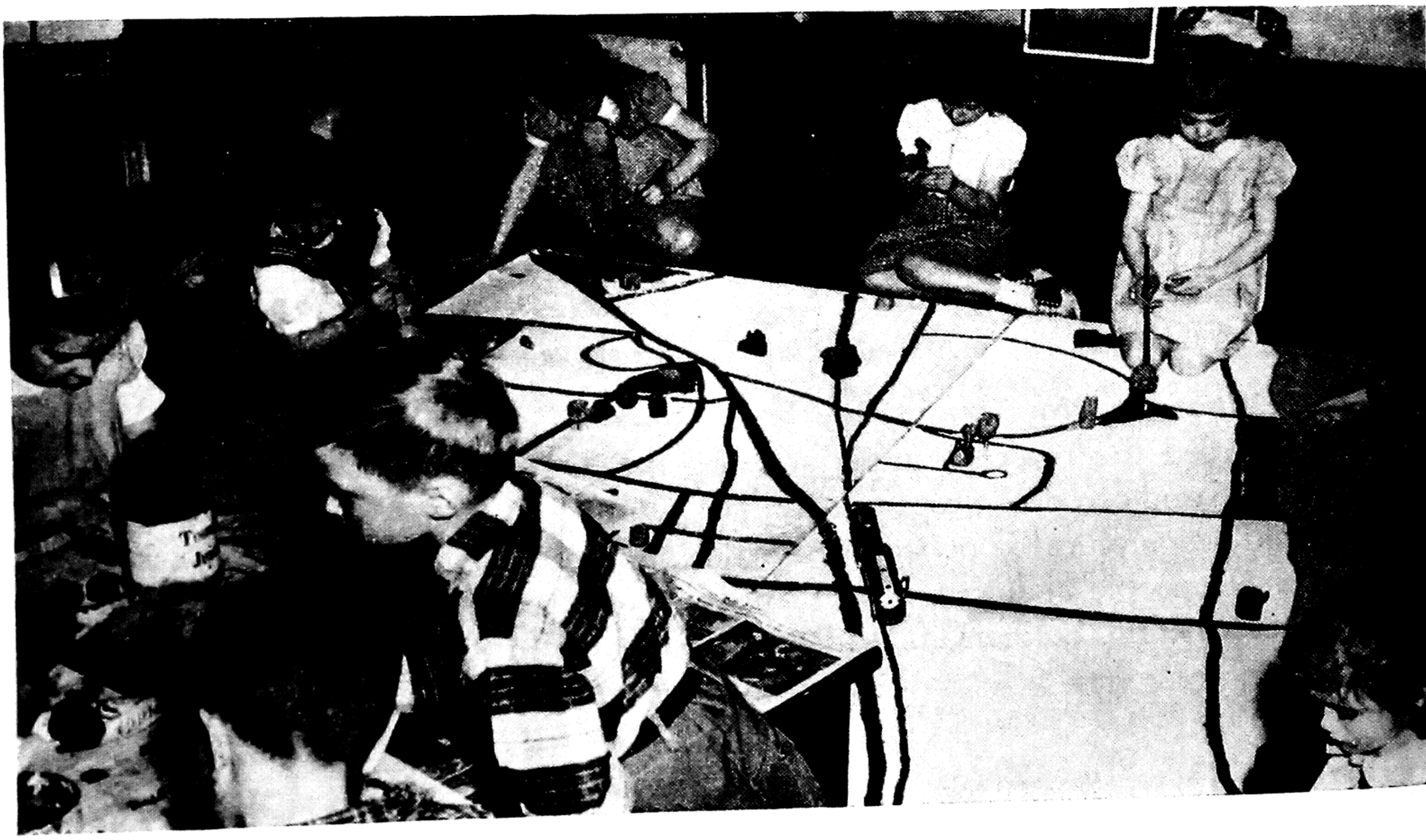
used them often. Those of the military in aviation found them, along with meteorology and astronomy, priority tools of their trade. We were, however, poorly equipped in this area. Before entering the service the average soldier's knowledge was limited to a grammar-school study of a cursory type. Aviation schools and flying fields were hard pressed to find instructors.

Now that the war crisis has passed will we drop back into the indifferent hit-or-miss teaching of geography? The world is shrinking. Distance no longer means what it once did. Nations and peoples are drawn closer together. A powerful instructional motion picture is needed on this subject, and now. In fact, several motion pictures are needed. A pilot who has flown around the world in the few days now needed for such a trip is one of the few persons who can appreciate the fact that the world has become smaller. Polar maps are now available showing air routes and distances in terms of hours of air travel. If the War brought the United States up-to-date geographically speaking, then she must keep up-to-date.

Map Making in School. Making maps, either in the form of hand-drawn, modeled in clay or sand, salt and flour, plaster, or what not, has

These children are learning about their community by constructing a floor map. Children locate places of interest and mark routes home for safety education.

COURTESY OF GLENCOE, ILLINOIS, PUBLIC SCHOOLS



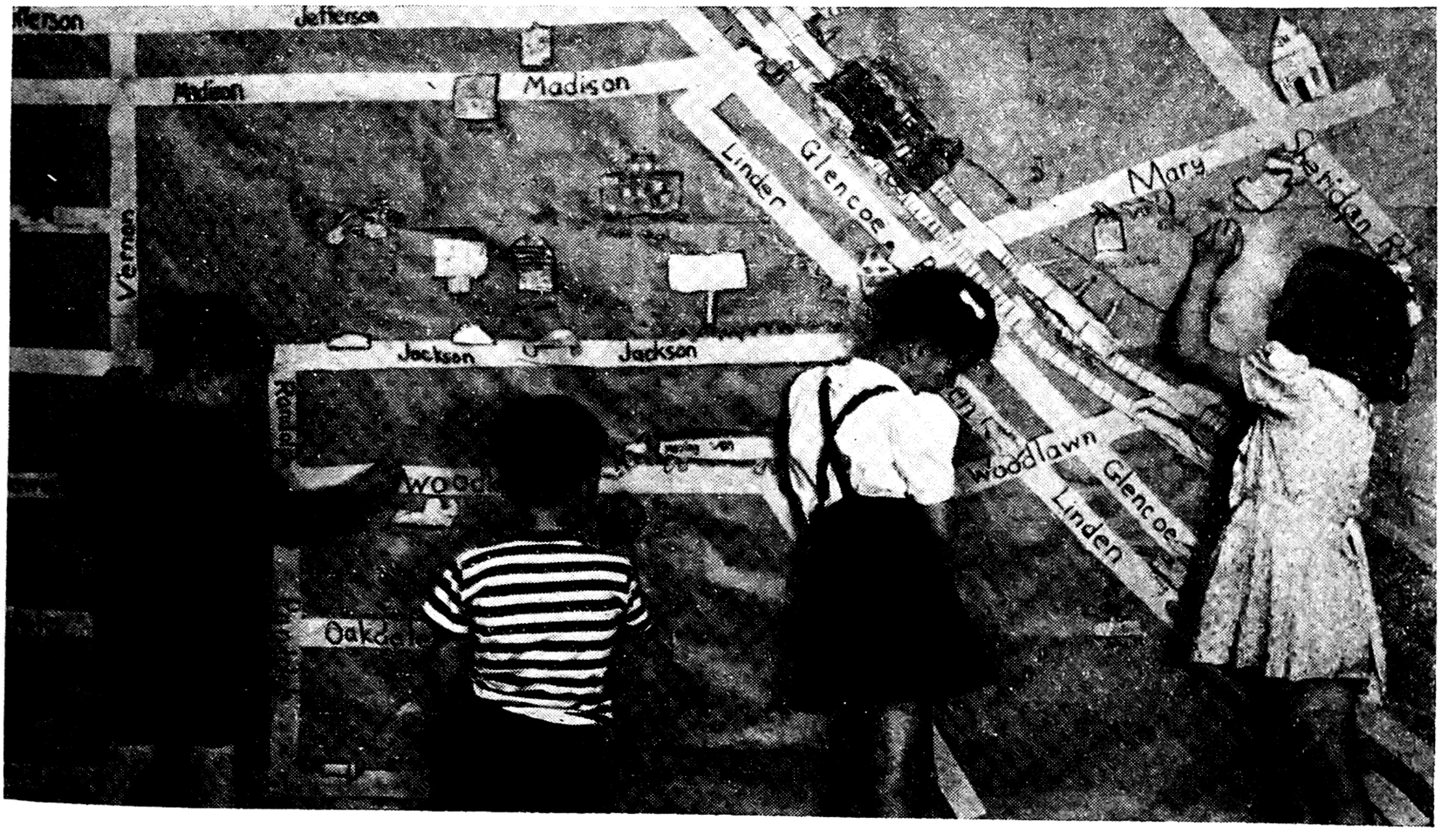
many values. Clear, fundamental conceptions of geography can be taught much easier through maps than textbooks. There is a fascination about maps and globes which assists children in learning the interrelationship of man and his environment.

But map making should be related to learning experiences in a fruitful manner so that the activity does not become an end in itself. Furthermore, maps should not be confined to geography or social studies alone, since their concepts and values pervade nearly every subject field. Map making should grow out of a need felt by the pupils.

Maps Must Be Taught. Since maps have a language of their own, they must be taught. In fact the map is about as easy as a foreign language for the beginner to read. To understand this map language fully it must be related to the pupils' experiences—direct and vicarious. Map study is so specific and so fundamental, that to make it functional in the classroom such study should be a part of the basic training of all teachers. Map reading is not merely the function of the geographer. In the use of maps and globes, too many teachers utilize them simply as reference tools. Maps are pulled down from the wall, lines or routes are traced and places located. That is all. The maps are replaced, having supposedly served

The floor map has now been improved and placed on the wall. The children are locating homes, churches, and their school. Note objects of interest on the map.

COURTESY OF GLENCOE, ILLINOIS, PUBLIC SCHOOLS



their optimum purpose. Like textbooks, maps need to be taught and to be used again and again in a variety of ways. Maps should be available to the students at all times so that they can find the answers to their problems and questions as their studies progress.

In the first and second grades much of the schoolwork is organized into projects. Maps and graphs can play an important role in developing projects. In the first grade a project may be developed around the immediate community. Maps may be drawn of the streets in the school district or of the primary and secondary roads in the rural district. Transportation lines and homes could be indicated, stores and business houses shown. Here is simple charting and mapping that enables the child to gain "a clearer conception of areas not seen by the eye." His world expands, and he grows in spatial understanding. The illustrations on pages 140 and 141 should be noted in this connection.

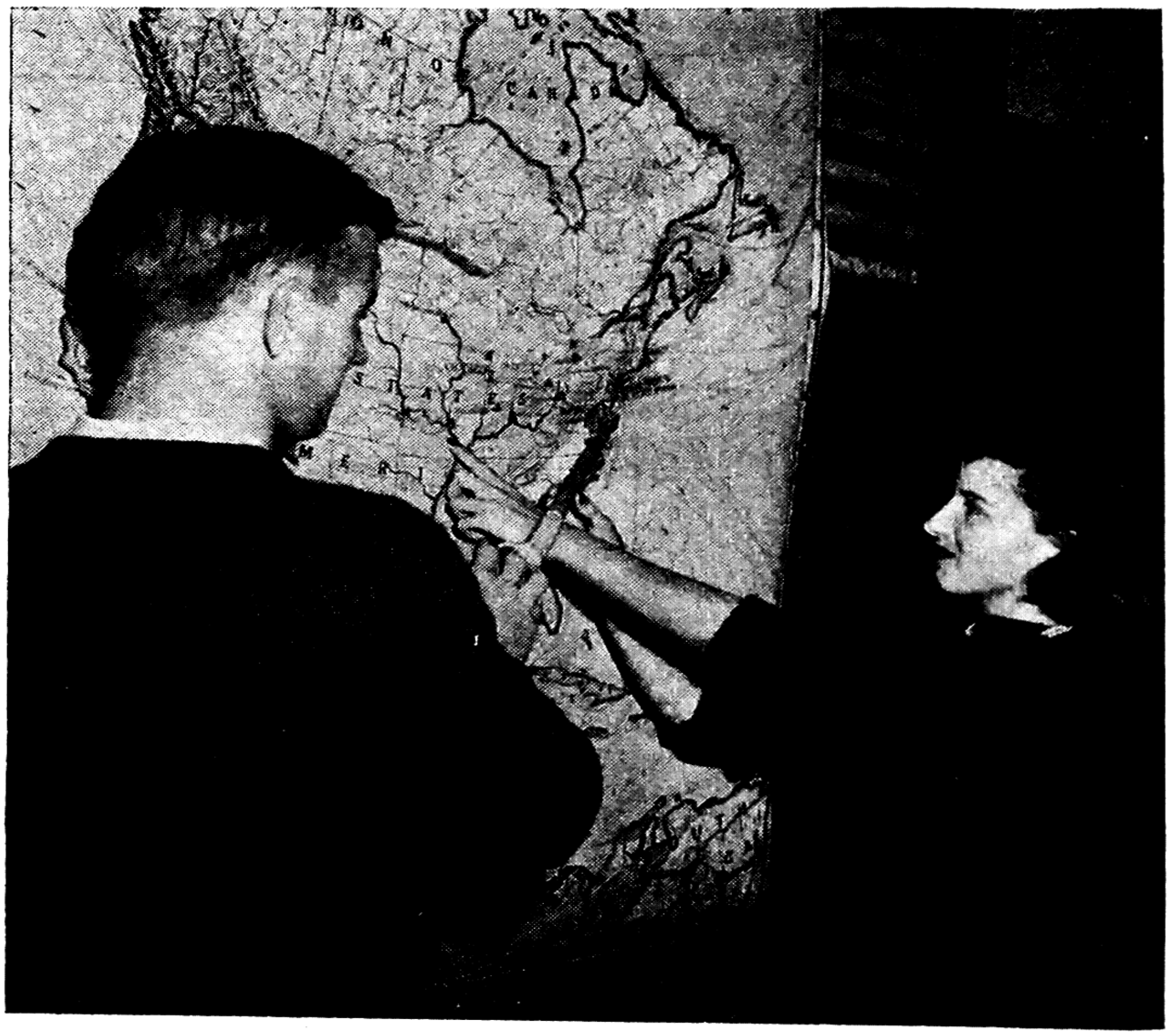
In the second grade a project for city children may be the farm or the post office. A trip may be arranged; then, a follow-up study. A logical part of the project could center around the location of the object of study. From the third or fourth grade upward the pupil is confronted with a systematic study of geographical information, in which most of the early lessons are based upon the children's experiences and observations. Maps thus become a part of the educational tool-chest of the pupil fairly soon in his school career and remain a part of his equipment for the rest of his life.

Standards in Selecting Maps. When maps are to be purchased, the school should adopt a systematic plan so that the greatest number of pupils and teachers will be served, and so that the materials purchased will be of good quality.

Selection of maps and globes for a school might begin by the appointment of a committee which is empowered to: (1) survey and catalog the maps and globes in the various buildings, (2) itemize the expressed needs of the various teachers, (3) prepare a listing of probable types which will be of value to teachers of different grades or subjects, (4) procure catalogs from several reliable companies, (5) prepare the list for final adoption in terms of the budget allowance, (6) set up plans for yearly purchases and replacements.

Materials finally selected should be carefully scrutinized by the committee in terms of the following:

1. Maps should be simple, accurate, and clear, and have minimum specifications:
   a. Title—meaningful
   b. Scale—actual or approximate
   c. Key or legend—full explanation
   d. Lines of latitude and longitude
   e. Source of data
   f. Date
   g. Coast lines extended to edge of sheet
2. Accuracy should be an uncompromising essential.
3. Maps should be of a size and scale so as to be read from a reasonable room distance.
4. Maps should be free from useless, or little used, detail.
5. Maps should be well mounted and housed in a dustproof case with spring roller.
6. Insets or inserts should be placed below the main map, not in the center.
7. Physical-political maps should have high priority.
8. Globes have high priority: they should be at least sixteen inches in diameter with a scale of one inch to 500 miles; of the physical-political type with movable meridian (probably equally important is a cradle mounting); simple and legible; well-mounted.



Maps on rollers are convenient. When not in use they may be rolled back into the dust-proof case.

COURTESY OF ATLANTIC CITY HIGH SCHOOL

9. World maps should show physical regions in hypsometric coloring according to the International Map of the World legend.
10. World maps should probably be one of the equal-area projections, such as Goode's interrupted homolosine or Goode's homolographic.
11. Individual and wall outline maps should be considered.
12. Minimum needs should be kept in mind: world map, continent maps, United States map, State map, sixteen-inch globe, and for each building a standard up-to-date atlas.

Maps Should Be Correlated With Other Visual Aids. It has already been pointed out that the purpose of maps is to provide clear concepts of space, distance, topography, climate, environmental factors, and other geographical phenomena. In the study of history, for instance, man's social institutions are reconstructed in as much of their entirety as possible. This involves form, conditions under which the institution evolved, evaluation, the people, the setting, contribution to succeeding social institutions, and so forth. Maps and globes are highly valuable in this study, but so are many other objective audio and visual materials. Some contribute to our knowledge of size, form, and spatial relationship, while others contribute knowledge concerning perspective, color, motion, sound,



World relationships is a big problem. It requires the use of textbooks, reference books, globes, pictures, and other materials for understanding.

COURTESY OF BATTLE CREEK PUBLIC SCHOOLS

and tactile impressions. Maps, although they are very necessary to lift the individual above his immediate environment and to stimulate his imagination, are low in degree of reality.

Nearly all of the audio-visual materials complement maps. The school journey is particularly appropriate in connection with the study of local environment. Lantern slides, stereographs, photographs, and opaque projection add reality through color and opportunities for comparison. Records and transcriptions will convey voices and tongues of peoples. Finally, the motion picture and television literally transport the student to that part of the earth's area being studied. No one of these materials actually replaces others. Each has its own contribution to make to reality and clarity of concepts. All of them significantly assist the pupil in his quest to understand man, things, the earth, and the inter-relationships of these elements.

POSTERS AND POSTER MAKING

Posters in their multitudinous forms are everywhere about us. Indeed, one cannot go to town, or to the doctor's office, post office, railway station, museum, library, school, ball park, store, filling station, or take a ride on a street car or subway train without seeing and being influenced by posters. Billboards, large and small, are special posters, and, unfortunately, are everywhere. Nearly every magazine cover is a poster. Even the railway express truck that passes us on the street is covered with posters. The jacket on the new book and the cover of the program at the theater or opera are posters. Many of our postage stamps are reproductions of posters and are designed for the same purpose. The poster has come to be an expressive form of American art. Its direct appeal is understood by the practical American people.

The Origin of the Poster. Drawings made on the walls of caves and caverns, or scratches on elephant's tusks or on the ribs of palm leaves by primitive man, were probably the first posters. Upon the ruined walls of Pompeii there are inscriptions in black and red, designed to attract the attention of passers-by. Old Roman streets, too, have their relics. But it was with the rise of trade and guilds in the middle ages that posters took more definite form. The craftsman and tradesman appealed to customers by posters in shop windows and doors. These posters were often an emblem of the trade, as a boot for the bootmaker or a bridle for the harness



"Hill City—Youth Municipality" is the theme for art work in Schenley High School. Housing, welfare, and better living will be lasting concepts acquired by this art student.

COURTESY OF PITTSBURGH PUBLIC SCHOOLS

maker. Peddlers decorated their carts with posters advertising their wares as fruit, fish, or baskets, depending upon the commodity for sale.

The term "poster" seems to have come into use in the sixteenth century, and although its origin is not clear, it may have had some connection with carrying a message. Before the London fire of 1666, the streets were often protected by handrails for the convenience of pedestrians, and on these were hung placards announcing goods for sale, services to be rendered, or events to take place. It is possible that Shakespearean performances were announced this way in addition to the hoisting of a flag over the theater.

In the nineteenth century the modern colored poster made its appearance. Its invention in 1866 is credited to Jules Cheret, who made a series of colored lithographs. An English artist, Fred Walker, in 1871 made a poster which he called "The Woman in White," which has become so famous that it is now hung in the Louvre Art Gallery. By the close of the nineteenth century, the poster was a common means of communication everywhere with the principles of artistic beauty of color and perfection of line and mass becoming established.

In the twentieth century in America, political campaigns and the mobilization of public opinion behind two world wars, have led top flight artists to turn their talents to poster work. A fairly good graphic history of World Wars I and II can be read in the posters produced. The

best of these are being preserved in the National Archives and in such galleries as the Museum of Modern Art. There is an unmistakable dignity, strength, and virility to the art of these posters.

Poster Making in the Schools. Poster making and use have become a part of the school curriculum and loom large among the activities which are begun in the primary grades and continued through high school.

Primary pupils begin poster making in connection with their first school experiences. They may be decorating paper picnic plates or making a booklet in which vocabulary lists are copied. In connection with health, for example, a booklet may be made of the seven basic foods by pasting cutout pictures on sheets of colored paper. The whole layout may be cut into the shape of a milk bottle and stapled together at the top. The shape of the booklet may be any one of dozens of shapes, but the cover page is a poster. Children progress through the use of simple designs and drawings of many kinds. Then come scissors and paste. Cutouts from magazines and newspapers are pasted up. Colored paper cutouts, simple forms for the younger children, and more complicated ones for the junior and senior high schools, make attractive posters.

Intermediate grade pupils have so much better muscular co-ordination and so much more imagination that the art of their posters begins to follow poster principles of color, design, balance, and to convey a message. Freehand and measured cutouts arranged in contrasting colors enable the intermediate grade pupils to turn out a first-class poster.

Lettering is one of the most difficult parts of poster making. Letters may be cut from newspapers by small children, and older ones may take squares of folded paper from which letters are cut. Freehand lettering is attractive but difficult. Inking with lettering pen or brush calls for a considerable amount of skill. Letters should be correctly spaced and proportionate. Poor letters can spoil an otherwise splendid piece of work.

Artistic and effective posters can be made in any school—rural or urban, rich or poor. City schools may provide the children with more and a greater variety of art materials, but ingenious teachers and pupils in a village school can turn out artistic work with wrapping paper, wall paper, box tops, pictures from magazines, Christmas card envelope linings, water colors, and crayons. Balance in design and a right feeling for brilliant colors in strong contrast cannot be purchased with expensive equipment.

Poster making correlates with all school activities, and with drives,

campaigns, special events, holidays, and promotions. It is an effective instrument in the school's public relations program.

No one should get the idea that the learning in connection with poster work is limited to mere skill. The poster must tell a story at a glance. It cannot be verbose. The slogan must be concise, pithy, and apt. A series of posters in a social studies or science class, for example, may reveal the development of an event or thing, such as communication, transportation, shelter, tools, modes of travel, or inventions.

Successful posters follow definite principles. They have simplicity of detail and one center of interest; the ideas they express can be comprehended at a glance; they never show improper balance. They possess attractiveness and interest sufficient to haunt the memory. Effectiveness at a distance is obtained by using plain lettering, attention-getting slogans, and color contrasts.

The Scientific Use of Color. Color is one of the most important elements in the poster. Just as music depends on sound waves, color depends upon light waves, and is defined as the sensation produced by the effect of the light waves striking the retina of the eye. Color has been called the "music of light," because it has tone, harmony, and a registered scale. Both sound waves and light waves produce sensations of pleasantness or

The mural and the sandtable can serve as complementary teaching aids.

COURTESY OF ATLANTA PUBLIC SCHOOLS



annoyance. Therefore, a knowledge of the effect of color is paramount. The following are the associations usually credited to certain colors:

Red	excites nerves, arouses feelings and motor impulses
Orange	is heating, soon excites irritation
Orange-yellow	is warm, lively, glowing
Yellow	arouses joy and gaiety
Yellow-green	is cheerful, smiling
Green	is restful, soothing, neither warm nor cool but neutralizing
Blue	is cooling, quieting, expresses serenity, spirituality
Blue-green	is sedate and somber
Lavender	is tranquil
Violet-blue	is stern, hard, unyielding
Purple	suggests stateliness, solemnity, richness, royalty
White	suggests purity, spiritual superiority, or physical immaculateness
Black	indicates spiritual darkness, gloom and death

Posters are not read at close range ordinarily; hence, the visibility of colors is important if they are to be used intelligently. Purple is the least visible color, and so it is used as a standard of comparison. Yellow has twelve times the visibility of purple; orange, nine times; green, seven times; red, five times; blue, three times.

MURALS—FRIEZES

Mural comes from the Latin word *muralis,* meaning of, or pertaining to, walls, therefore a wall painting. Murals are popular in schools and public buildings of many kinds. Several American artists are well known for their murals, as Thomas Benton and Boardman Robinson; the Mexican artist, Diego Rivera, is known internationally.

Upper-grade and high-school students attempt many projects in murals, usually in connection with the art classes or in combinations of art and social-studies classes. These murals may be done on paper or cloth and then attached to the walls for temporary use. Sometimes they are done in crayons on the blackboard; also there are a great many more ambitious projects painted directly on the walls to be more or less permanent. Not



COURTESY OF PITTSBURGH PUBLIC SCHOOLS

These upper-grade pupils are making a mural for their school. Is the theme appropriate for an industrial city?



COURTESY OF LABORATORY SCHOOL, UNIVERSITY OF CHICAGO

These small boys are decorating a corner of a hall with a design made by the pupils themselves.

only are these good art projects, but they integrate a great deal of knowledge. Themes concerned with local history, national development, growth and development of inventions, or school life and activities are common. Murals with their overlapping and superimposition give a posteresque effect.

The frieze is architectonic and stereotyped and is seldom used as a school project.

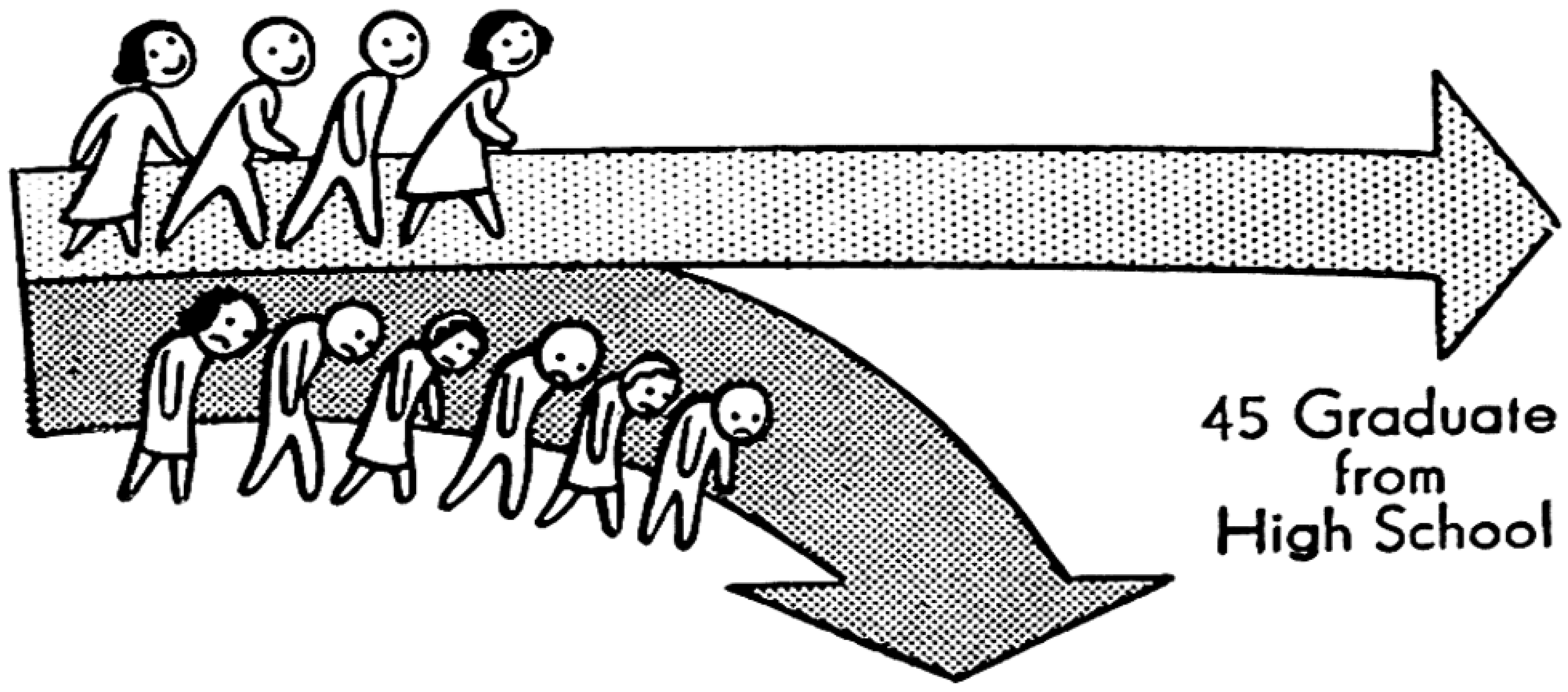
CARTOONS

Cartoons are closely related to several graphical representations, especially pictographs, pictorial maps, and posters.

A cartoon may be defined as an interpretative picture making use of symbolization and often bold exaggeration in order to present at a glance some message or point of view concerning news events, things, or situations. Cartoons are usually hand drawn and are laconic in their message.

School Utilization. Some may question whether children can use the cartoon medium to assist them in the interpretation of social, political, economic, literary, and scientific data. Do cartoons, because of their simplicity and uniqueness, assist in the formation of concepts and the

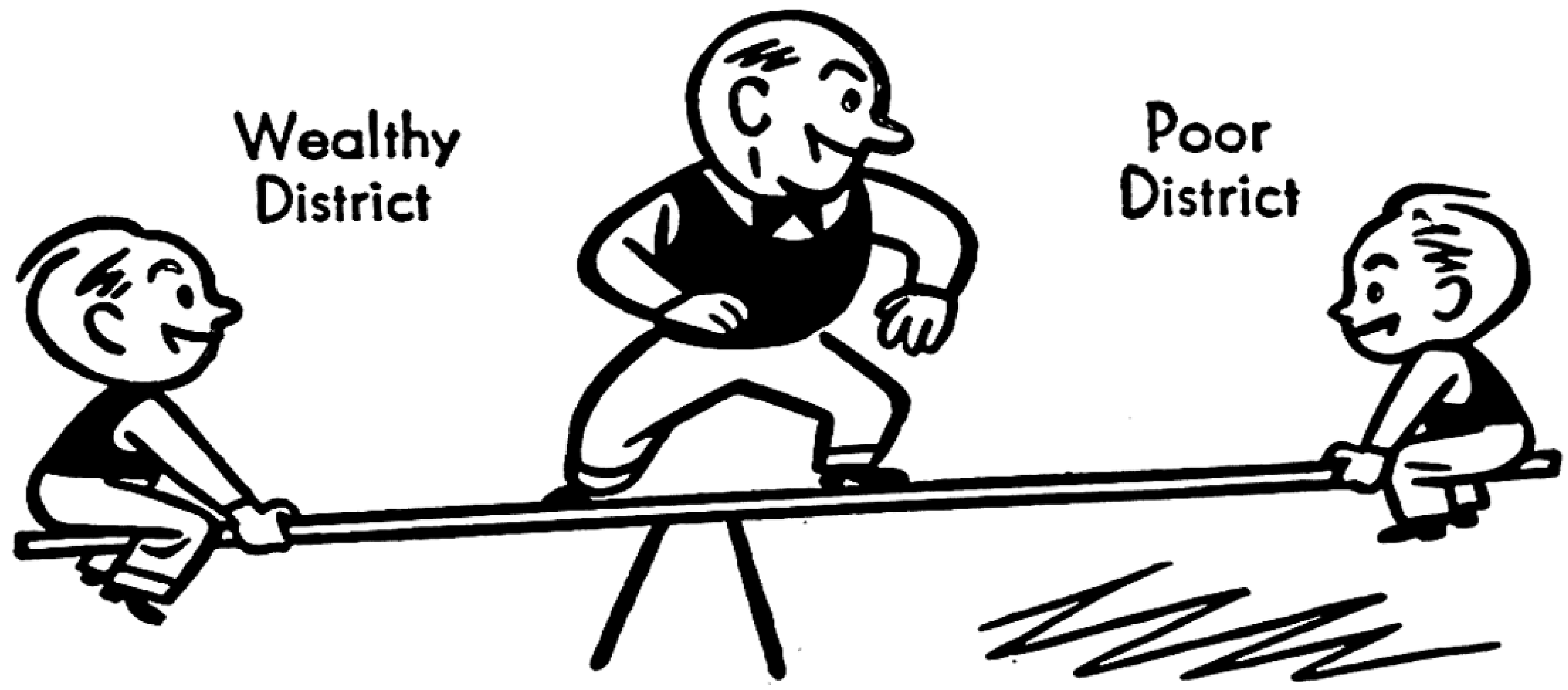
development of the ability to abstract and generalize? Only a few scientific studies have been directed to these problems. The general opinion of psychologists and educators is that cartoons do have educational value, but not without some qualification. Their values seem to lie



Of every 100 youngsters 55 drop out of school
BOREDOM and FRUSTRATION - factors behind drop - outs
FROM *School Life,* DECEMBER, 1948

in the fact that they are compact and have noticeable attention-getting qualities. Their impact stems from their vividness and dynamics, and the technique has in no sense become stale or stereotyped. In small space they carry more associations than a host of words. Although many cartoons are

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highly symbolized and depend upon abstract interpretation, others are concrete. This range makes it possible to adapt them to maturity levels.

Teaching with cartoons seems limited in many respects. Unquestionably care must be exercised to see that too much emphasis is not placed on them or they will, in all probability, lose their unique benefits. Understanding cartoons is much the same as understanding pictures and drawings. There are three discernible stages: enumeration of things in the

picture, description, and finally interpretation. Since there is little to be gained from a study of cartoons short of interpretation, it would seem that only limited use can be made of them below the junior high school. At some point in the teaching there should be specific instruction on the purpose which cartoons serve; also, how to interpret them. There is some question as to the value of captions and explanatory materials. The quality of the drawing should be high. The teacher will have to be alert to see that the pupils do not confuse the ridicule and exaggeration of the cartoon with fact. This can be successfully done by integrating the concepts of the cartoon with previously studied facts and formulated generalizations.

Comic Strips. Comic strips differ from cartoons in many ways. Comic strips and comic books are serial or continuous stories with many separate but related cartoons.

The educational value of the newspaper comic strip and the comic magazine and book are open to grave question. Many educators of sound judgment berate the comic strips as a type of "infantilism" or "graphic insanity." Other educators of equally sound judgment defend them, but their defense is usually along quasi-negative lines; they say that if children are going to read comics anyway, then the educators should join the procession and improve the medium. Others say they desire to assist the child in his development, and if it takes a comic strip to do it, then they will use the comic strip.

The comic strip is now fifty years old and has a firm grip on the general populace. It has become a big business. Four out of five people who read newspapers, read the comics, and some fifteen to twenty million copies of comic books and magazines are sold each month.

But why consider comics from the standpoint of the schools? Those who defend the comics list these arguments:

1. They are easy to read, hence encourage reading.
2. They build vocabulary.
3. They satisfy the collector's urge.
4. They are amusing.
5. They are exciting—in theme and plot they are not very different from the radio and motion picture.
6. They are inexpensive.
7. They satisfy the children's ideas of art.

Many suggestions have been offered for re-directing the child's comic drive into other and more acceptable channels. Some of these are:

1. Provide children with more books and magazines.
2. Be sure that the books have easy reading matter.
3. Provide plenty of adventure stories.
4. Lift the stories in the readers out of the "sissy" class.
5. Accept the comics, but strive to have better comics such as the ones sponsored by *Parents' Magazine*.
6. Try to induce the comic artists to build more of their features on history, real life stories of worth-while personalities, the Bible, literary characters, and the like.

Making and Using Cartoons and Comics in School. Only slight attention is given to the drawing of cartoons and comics in school. Some teachers use matchstick drawings to illustrate their teaching, and occasionally pupils will resort to these figures to assist them in making a report. Art departments rather generally disregard these media of expression. A large number of textbooks now include a limited number of cartoons. The cartoon is valuable as context material for the bulletin board, and often effective posters can be built around it.

At the college level, the cartoon is used as a textbook illustration in history, sociology, economics, political science, and commerce. As a means of re-enforcing verbal directions and demonstrations, instructors in the quantitative laboratory at a large university employ the technique of posting cartoon placards which remind students of common errors in laboratory methods.

Comics, Cartoons, and Motion Pictures. The use of comics and cartoons in the motion picture has advanced to a point where some of the comic characters are as well-known or better known than human personalities. Mickey Mouse, Donald Duck, and Porky are favorites with adults as well as with children. Walt Disney has elevated the animated cartoon to the realm of art. Universities confer honorary academic degrees on him for his service to education and public recreation. Disney has made educational history by turning the activities of his cartoon characters to educational themes. Some of these subjects filmed in color are: *Grain That Built a Hemisphere, South of the Border, Defense Against Invasion, Water—Friend or Enemy, Winged Scourge,* and *Something You*

Didn't Eat; the contents are respectively a story of corn, Latin America, vaccination, pure water and sanitation, mosquitoes, and foods and nutrition. In *Old Glory,* Porky, the pig, wonders why he should memorize the Pledge to the Flag until the spirit of Uncle Sam comes to him in a dream and takes him back through the pages of American history.

Motion-picture cartoons did a magnificent piece of "selling" during the war, both for children and adults. *Out of the Frying Pan into the Fire* used Pluto to impress upon housewives the necessity for salvaging waste fats. Other cartoons dealt with taxes, health, and general morale. As a part of the good neighbor policy, the United States government had produced and sent to Latin America many cartoon films dealing with tuberculosis, malaria, yellow fever, basic foods, and general health. Some of the films were made especially for illiterate adults.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Procure the standards by which one of the national poster contests is judged. Make a set of standards which might be given the judges of a similar contest held in your school.
2. Discuss the newer concepts in the teaching of geography. List all the audio-visual materials which will assist geography teaching in attaining the concepts discussed.
3. Are the values attributed to maps and globes in the text exaggerated? What evidence have you for your answer?
4. Draw up a set of standards by which pupil-made maps may be objectively evaluated.
5. An age or grade listing of graphic materials should be made. As the materials are listed under each grade or age, each should be evaluated as to its educational possibilities for the group by use of such notations as: extremely valuable, great value, average value, some value, no value.
6. Prepare a comprehensive survey of the amount and utilization of graphic materials used in your school district or county. Such a survey will be well worth the time necessary for the project. After the data have been gathered they should be carefully analyzed, and should include both findings and conclusions.
7. Show how each of the graphic tools of this chapter may be effectively used in community relations.
8. Show how teachers can stimulate students to use graphic media in their reporting, recitations, and written work.

LABORATORY EXERCISES

1. Prepare a set of hand-made graphs and charts for each of the types discussed in the text, and for any other types not covered by the text. Use data related to this particular course.

2. Make a relief map of a state, nation, or continent. Use an extra heavy cardboard or a piece of plywood about the size of a desk blotter. The map may be made of either salt and flour, paper pulp, clay, or plaster. Consult Newkirk, L. V., *Integrated Handwork for Elementary Schools*, Silver Burdette Co., New York, 1940.
3. Each member of the class should prepare a poster (any size) to be used on a school bulletin board calling attention to this course in Audio-Visual Education.
4. Prepare a poster about your school which might be used in a downtown shop window.
5. As a committee project draw a mural on paper to be used across the front of the room. Select any pertinent subject.
6. Read the article by G. O. Ream, "Cartoons and Chalk Talk in the Classroom," *Journal of the National Education Association*, 24: 233–34, October, 1935, or any similar reference on simple cartooning or match-stick drawing. Then try illustrating a child's story such as "Peter Rabbit" or "The Little Engine That Could."
7. Project the motion picture, *How to Draw Cartoons*, 6 reels, 16-mm., sound: Reel 1—"Figures;" 2—"Action;" 3—"Heads and Expressions;" 4—"Animals;" 5—"Hands, Feet, Clothing and Drapes;" 6—"Composition and Story." The films may be rented from your motion picture distributing library or they may be rented or purchased from the producer, International Theatrical and Television Corp., 25 West 45th Street, New York City. Rental $2.00 per reel, sale $40.00 per reel. Filmstrips of the same content are also available.
8. Project several of the colored animated cartoons which were named on page 153. These films may be rented from your film distributing library. They have definite educational value. Analyze and discuss them fully. Rental rates will vary from $.50 to $3.00 per reel depending upon subject.
9. Consult the *Scholastic Magazine* about the time and place of the next poster contest for your area. If there is one in the vicinity, the class will profit by a trip to it.
10. Don't overlook the blackboard as a medium for teaching graphic statistics. Illustrate.
11. Four significant motion pictures of maps and their functions are now available. The class should study these films since they illustrate the principles described in this chapter.
    (a) *The Airplane Changes the World Map*, 1 reel, 10 minutes, sound, black and white. Producer: Encyclopedia Britannica Films, Inc., Wilmette, Illinois. This film describes the newer concepts of distance between points when travel by land and water are compared with air. The early sequences in the film discuss early map theories and show the advantages and disadvantages of each. Several projections including those of Mercator and Goode. Consult your nearest film library for rental.

(b) *The Impossible Map,* 1 reel, Kodachrome, sound. Producer: National Film Board of Canada, 620 Fifth Avenue, New York. Offices in Chicago, Washington, and Toronto. A grapefruit, paint and brushes, a knife, transparent sheets of paper are used to show how difficult it is to make an accurate representation of the world on a flat surface. The grapefruit, painted to approximate a globe, is sliced and peeled. The pieces are arranged under the celluloid and the painted area copied. The result is accurate in the center but distorted toward the poles. Various arrangements are tried but the difficulties of representing the globe's land areas on a flat surface are obvious. Consult your local rental library or write the producer.

(c) *Global Concepts in Maps,* 1 reel, 11 minutes, color or black and white, sound. Producer: Coronet Instructional Films, Coronet Building, Chicago, Illinois. The film treats three main concepts: the globe, projection, and distortion. A boy masters the global concepts. He traces Great Circle Routes on a polar projection and explains distortion and three types of projection: cylindrical, conic, and perspective. Consult your local rental library.

(d) *What Is a Map,* 1 reel, 10 minutes, sound, black and white. Producer: Young America Films, Inc., 18 East 41st Street, New York. Excellent film to show how to introduce the teaching of maps to young children. The film approaches the understanding of maps by having a little girl map her room and the objects in it.

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Chapter 8

PROJECTED STILL PICTURES

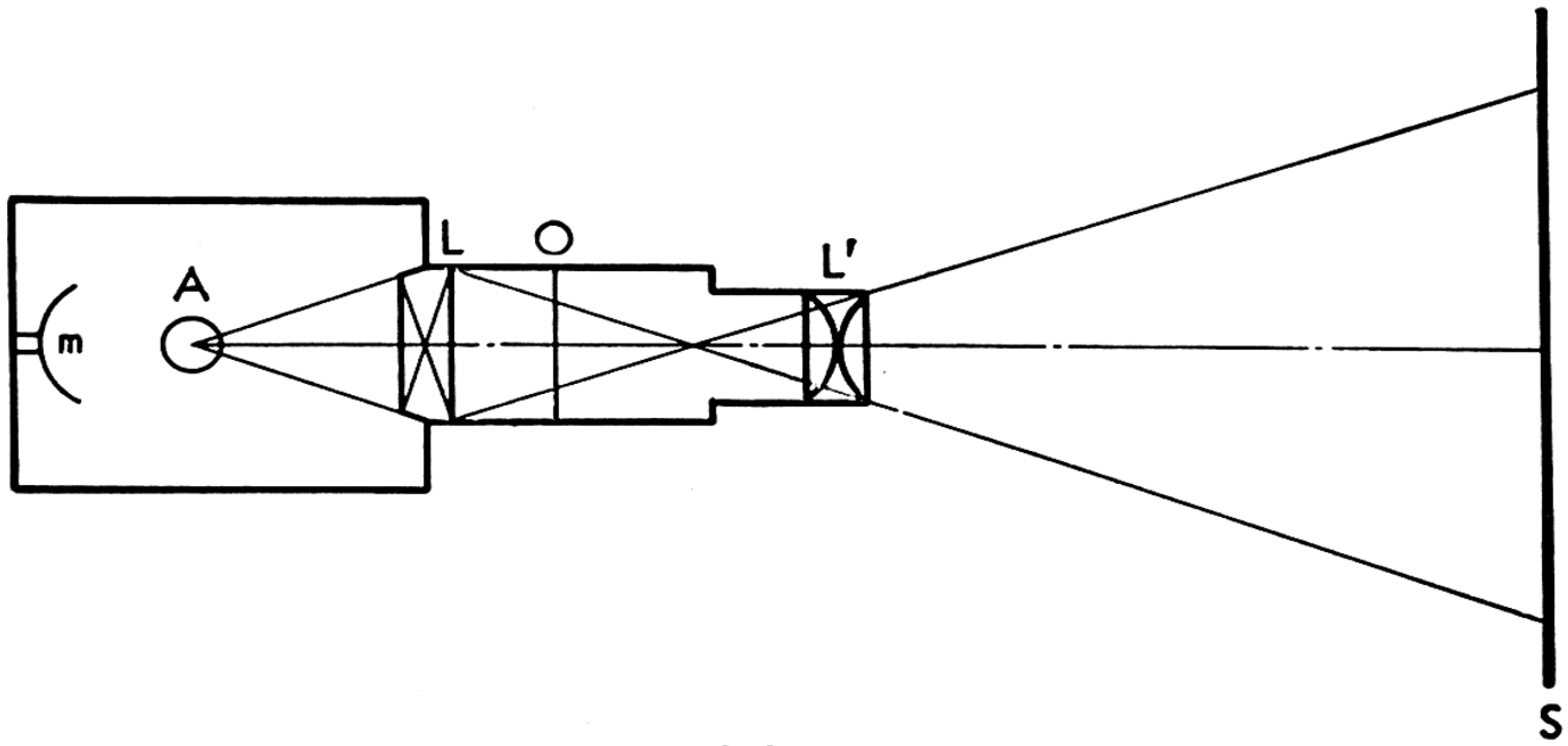
This chapter on projected still pictures will include standard lantern slides, positive transparencies, filmstrips, opaque projections, micro-projections, overhead projections, and the stereograph. The stereograph is not actually a projection; it is a three-dimensional picture which requires simple equipment for its utilization. As such, it is between the flat unprojected picture requiring no equipment and the projected picture.

The limitations of flat pictures can be overcome by projecting them onto a screen so that all the members of a class can focus attention on them at one time. In projection, pictures may be enlarged to any size. Pupil interest in projected pictures is high for three reasons: (1) there is a uniqueness about projected pictures, (2) they vary the recitation procedure, and (3) every member of the class sees and discusses the same things.

STEREOPTICON OR STANDARD SLIDE PROJECTOR

All projection requires apparatus, although the principle in its most elemental form is illustrated by the shadow. The shadow, however, is not a true projected picture because it shows form only in silhouette and is completely devoid of details.

Principles of Projection. It is essential that every teacher understand the principles of projection as well as the operation of machines and



The Principle of Lantern Slide Projection

m = mirror or reflector, A = light, L = condensing lens, O = object to be projected, L′ = objective lens (es), and S = image on screen. It should be noted that O is slightly farther from the lens L′ than from lens L.

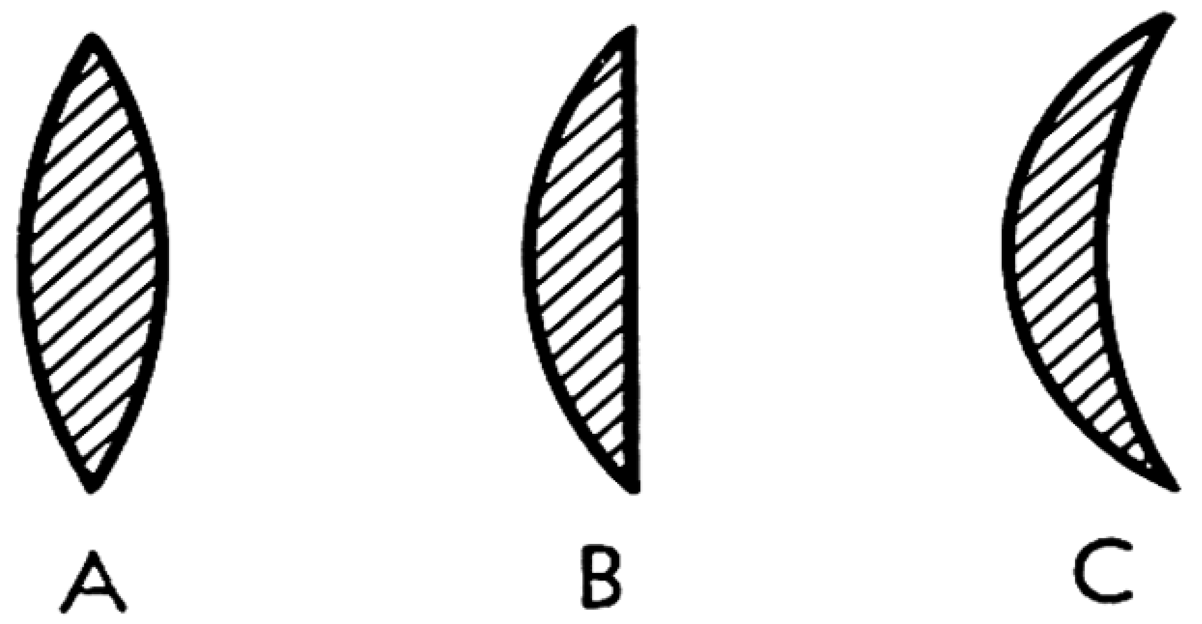
their utilization in the classroom. Projection is based upon fundamental principles of physics, and all types of projection are similar. The explanation which follows points specifically to the stereopticon; adaptations to other types of projectors will be explained as they are discussed later in the chapter. A strong light is placed in front of a concave mirror which acts as a reflector. The light passes through a set of condensing lenses which gather up the rays and distribute them equally over the transparent picture slide. Then the brilliantly lighted image is caught by the double-objective lens and focused on the screen, where it becomes a visible picture.

Teachers should be thoroughly acquainted with the various parts of the lantern and their function. This is the only way to ensure proper

projection. The teacher should know the cause and remedy of fuzzy images, of no image at all when the switch is turned, of images fringed with color, or of images which are too large or too small. A brief discussion of some of these points may be helpful.

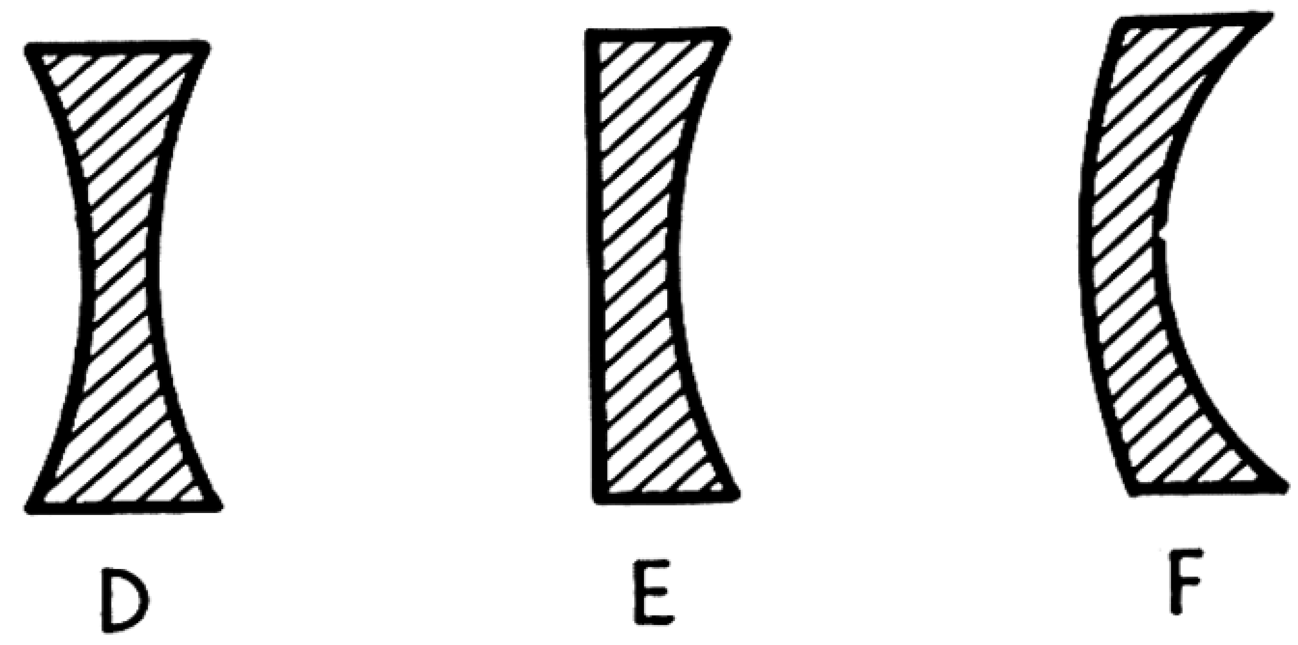
A lens may be defined as a portion of a refracting medium bounded either by two curved surfaces or by one plane surface and one curved surface.

Lenses may be divided into two classes as illustrated in the drawings below.



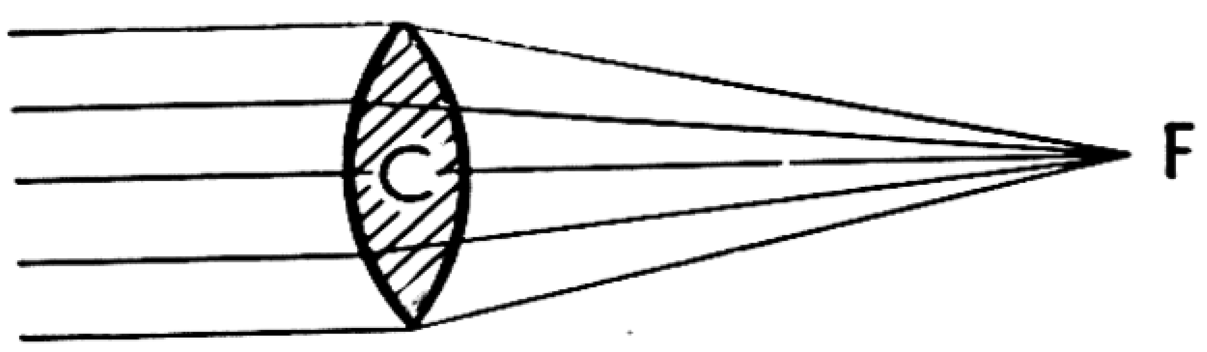
Convex or Converging Lenses

A—double-convex
B—plano-convex
C—converging meniscus

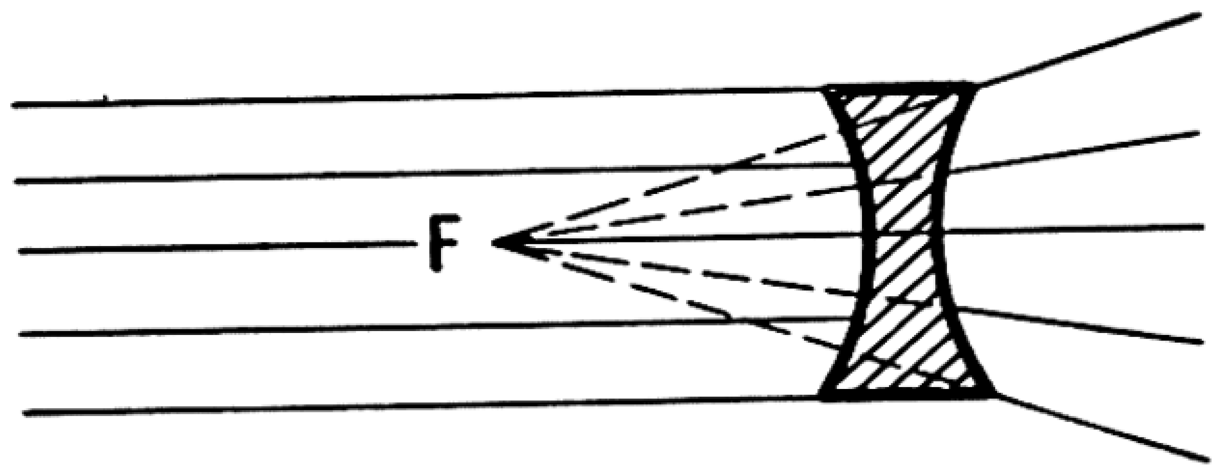


Concave or Diverging Lenses

D—double concave
E—plano-concave
F—diverging meniscus



Convex Lens



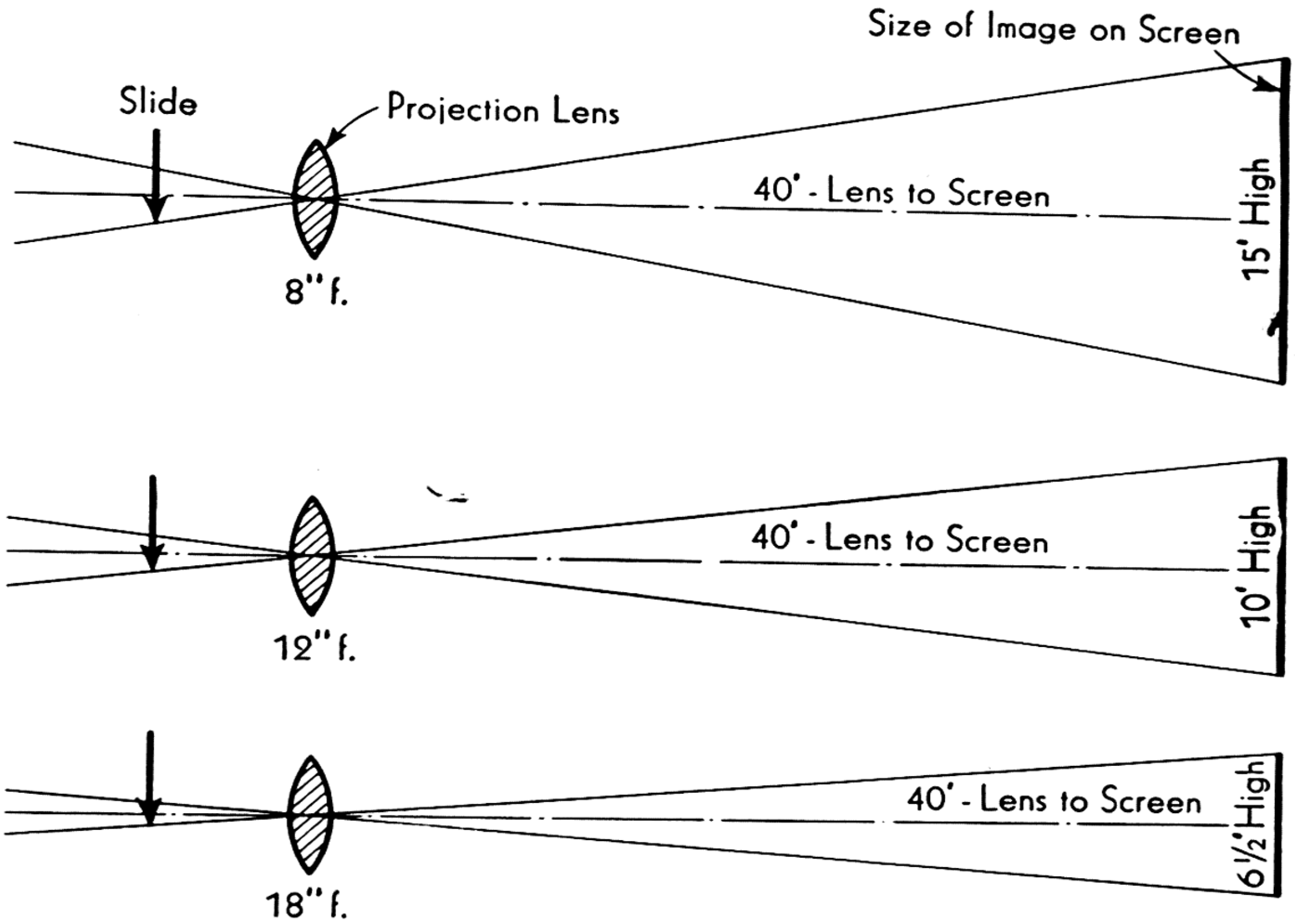
Concave Lens

In the illustration above, the line passing through (C), the optical center of the lens, and perpendicular to its faces is called the *principal axis.* F is the *principal focus,* the point where the light rays converge. Light rays are without appreciable curvature, but when they pass through a lens they are refracted. Refraction depends upon the density of the medium through which the rays pass, that is, the speed of light is slowed up by the medium. Consequently the rays, except when perpendicular to the medium, bend. Since the speed of the rays through the center of the medium (convex lens) is retarded and through the outer portions is faster but refracted, the rays will approach a center or *focus* at F. The last drawing shows how the rays are refracted in the opposite direction owing to the fact that a concave lens is used. Remember that the rays will be bent toward the thicker part of the lens. The *focal length* of a lens is the dis-

tance between the principal focus and the optical center of the lens, usually denoted by the letter *f*. Camera lens, for example, are listed as f 1.5, f 3.5, f 4.5, etc. CF is the focal length in the illustration.

Focal length is important. It is directly proportional to the distance from lens to screen, and inversely proportional to the size of the image on the screen. Note the accompanying illustration.

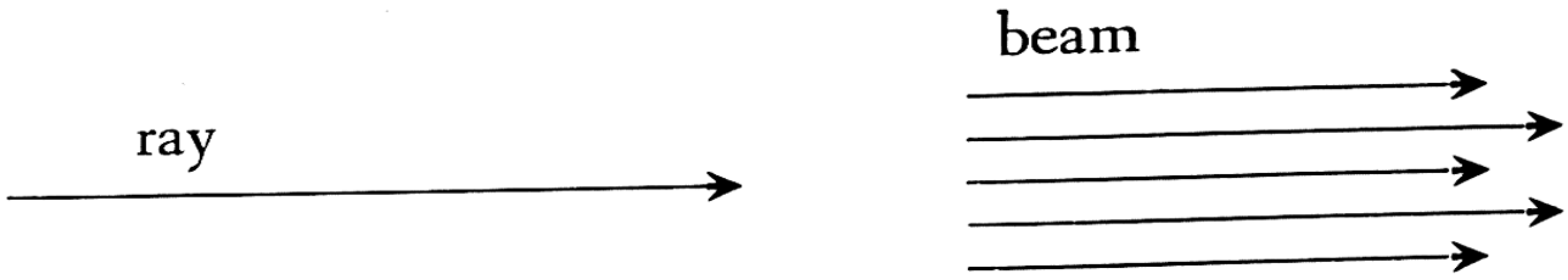
In like manner the illustration on page 163 shows that the image on the screen varies directly with the distance from the lens, the greater the



Relation of Focal Length to Size of Image

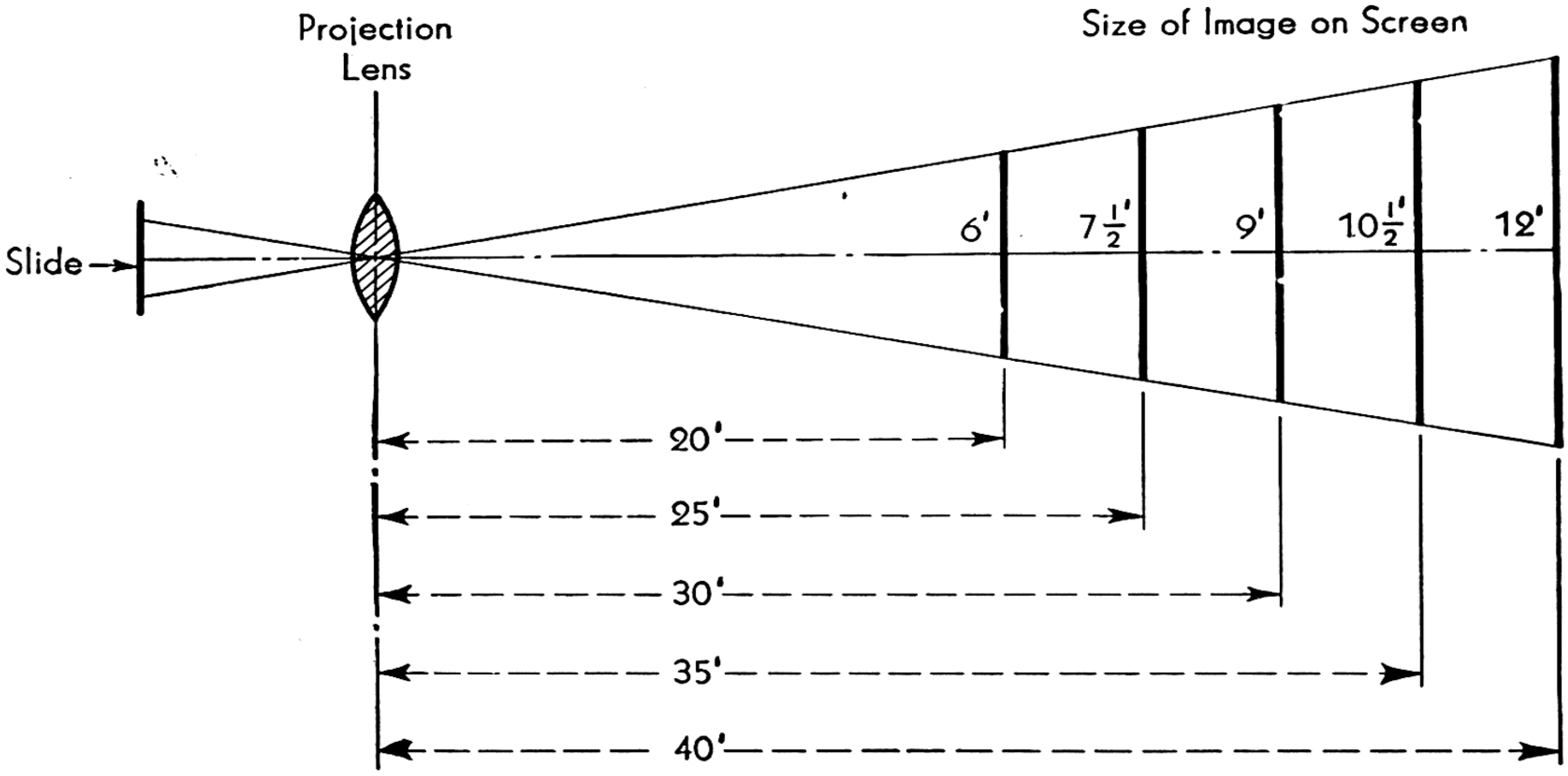
distance from lens to screen, the larger the image, if the lens is unchanged.

Not only is the size of the image important, but its illumination. The law is that the intensity of illumination per unit of area varies inversely as the square of the size of the picture. Obviously then, the larger the picture the less brilliantly illuminated it will be. Teachers must, therefore, try to strike a happy medium in order to obtain maximum results; the image must be large enough for every child in the room to see distinctly, but not be overly large because the image is dimmed correspondingly.



A *ray of light* may be thought of as an extremely fine line of light. A beam of light is made up of a large number of rays, like the light made by a searchlight.

Teachers sometimes wonder why a projected image which is apparently well focused in the center is out of focus at the edges, or why the image seems to have a halo produced by light rays which do not focus properly.



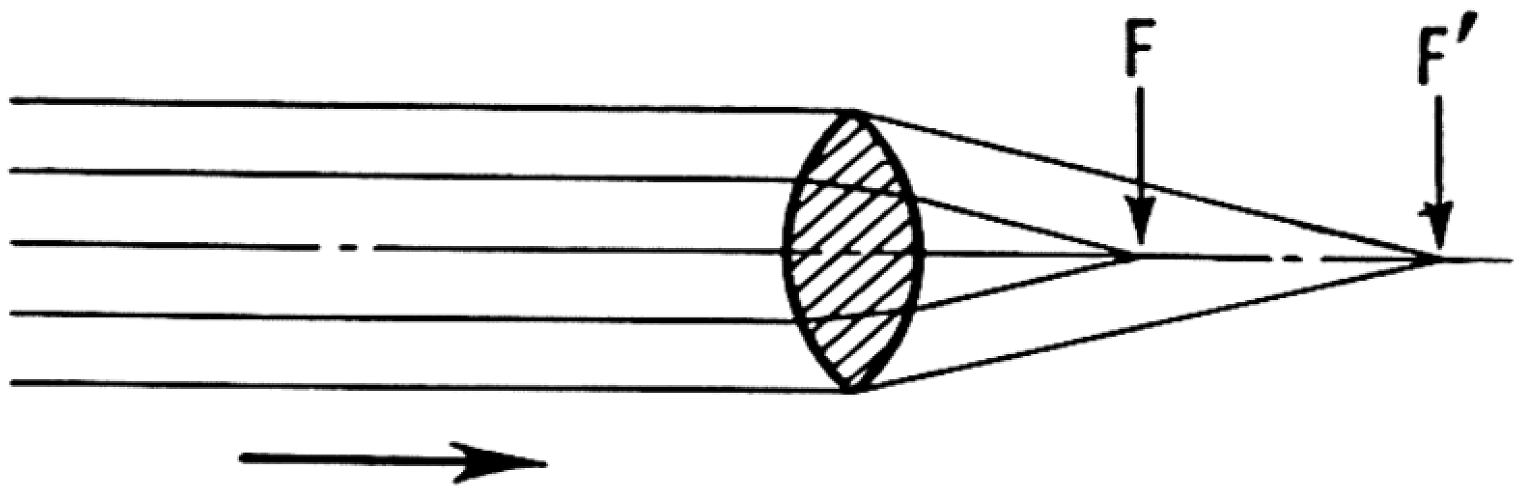
Relation of Distance of Lens from Screen and Size of Image

This is quite likely caused by a *spherical aberration*. It has been assumed above that the refracted rays will be refracted uniformly and have a common point of intersection, but, in reality, this is not necessarily true. Instead of a single focus, there is a series of foci distributed along the principal axis. In the first drawing on page 164 this is observed at F and F′.

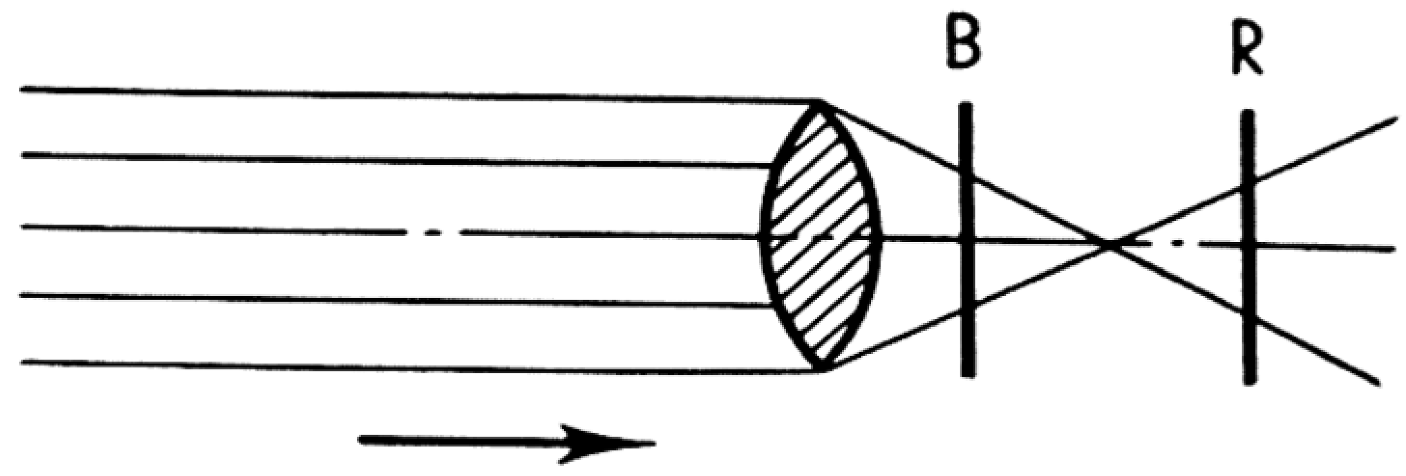
Spherical aberration can be corrected in two ways: (1) by the use of a diaphragm before the lens, and (2) by the use of a corrected, compound-objective lens (two or more lenses).

It should also be noted that light rays of different lengths bend differently when passing through a medium. In the illustration at the

right below, B, blue light, is brought to focus nearer the lens than R, red light. Other colors will be brought to focus at points intermediate between B and R. Compound or achromatic lenses overcome this *chromatic aberration*. When a simple lens is used, images are usually fringed with color.



Spherical Aberration



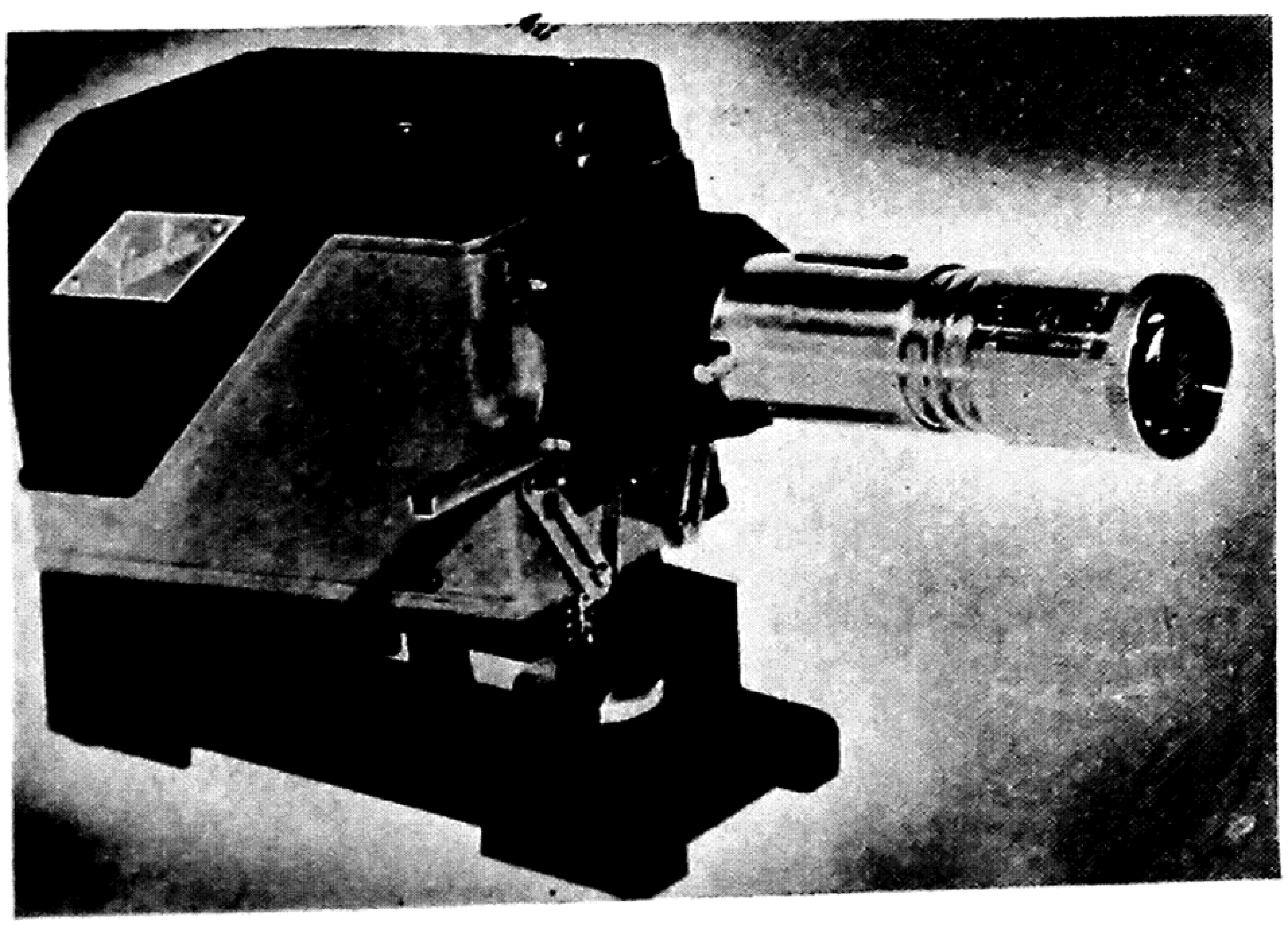
Chromatic Aberration

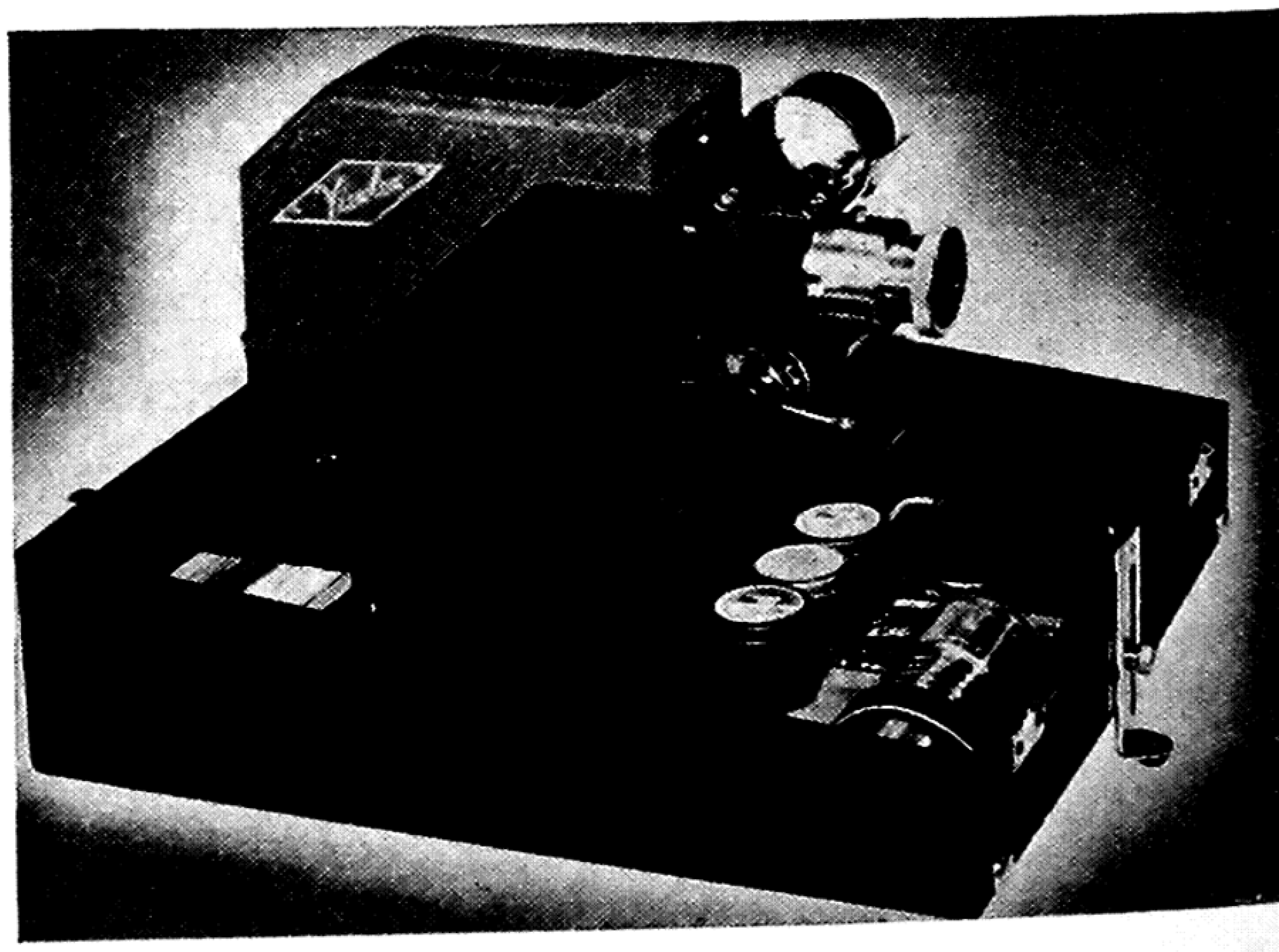
Good projection equipment made by reliable manufacturers usually corrects the difficulties discussed above. The operator of a projection lantern should be certain that all lenses are clean and firmly fastened in their correct places. The light should be of the correct voltage and wattage, and be placed with the filament properly aligned with the lenses. This latter requirement is usually taken care of automatically because the better grade lanterns are equipped with prefocused lamp sockets.

The Development of the Standard Slide Projector. The standard slide projector of today traces its history back to the magic lantern which was invented by a man named Kirscher in 1643. Up to the time of Daguerre and Niepce pictures were painted on the slides by hand. Illumination varied, but the commonest sources were the coal-oil lamp and hydrogen or calcium lights. Improvements of many kinds were made in the magic lantern during its long history. Attempts were made to introduce synthetic

(Left) This model projects slides only. (Right) This is a dual-purpose machine. It projects 2 x 2 slides and filmstrips.

SLIDE PROJECTORS BY VIEWLEX, INC.

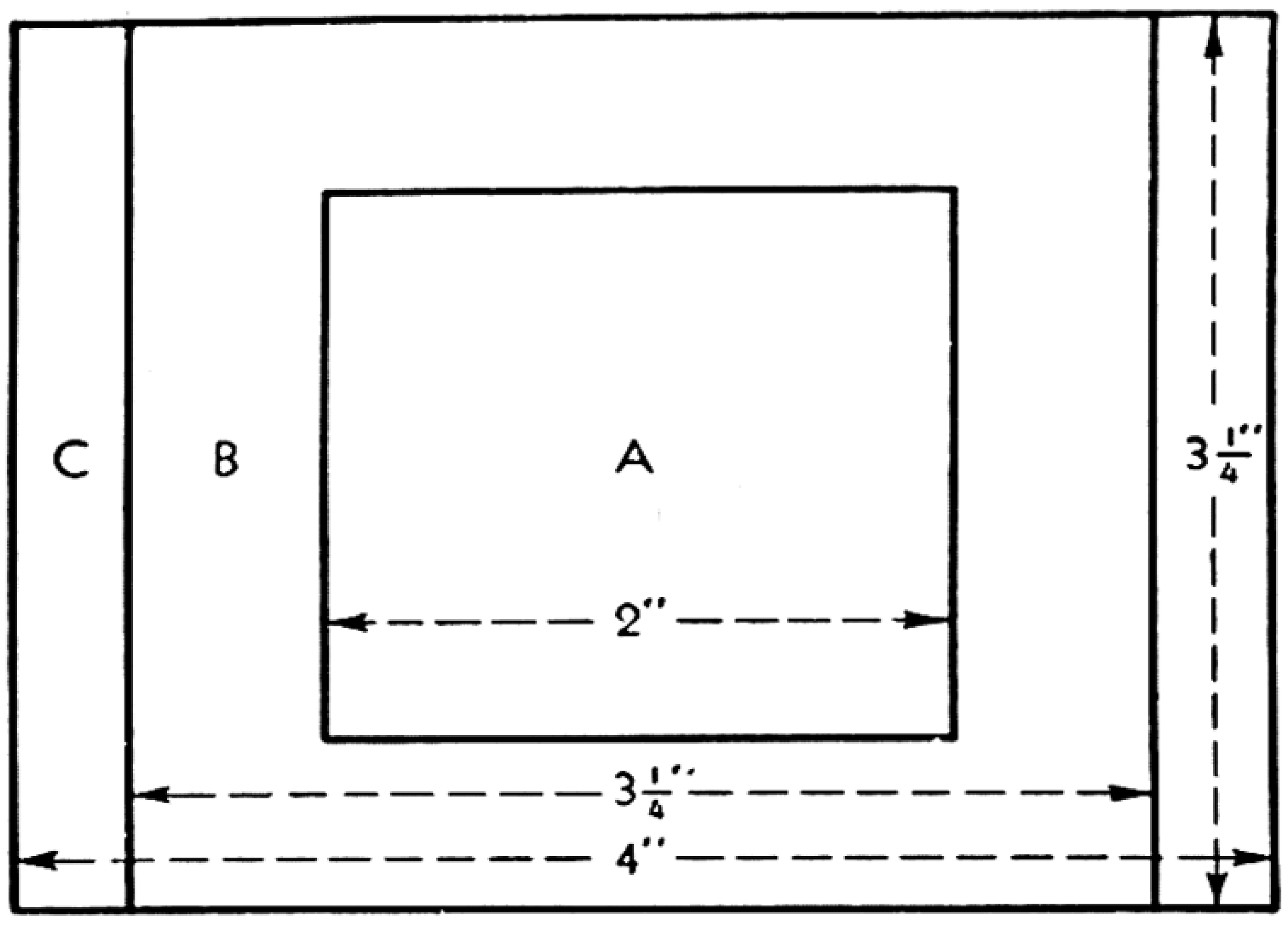




motion into the projected pictures by means of "slip slides," levers, and dissolving views. Edison and Lumiere experimented with the lantern projector before their inventions of the motion picture.

The term *stereopticon* came into use with refinements of the magic lantern around the latter part of the nineteenth century. Today the use of the term seems to be passing, and in its stead there have been substituted terms such as slide projector or lantern-slide projector. These terms refer to the standard 3¼" x 4" slide. The smaller slide projector is invariably spoken of as the 2 x 2 projector.

Sizes of Glass Slides. There are three sizes of glass slides in use today, as shown by the accompanying illustration.



Glass Slide Sizes

A. Miniature filmslide. These slides are made from film positives of 35-mm. motion-picture film. The picture size is ¾" x 1".

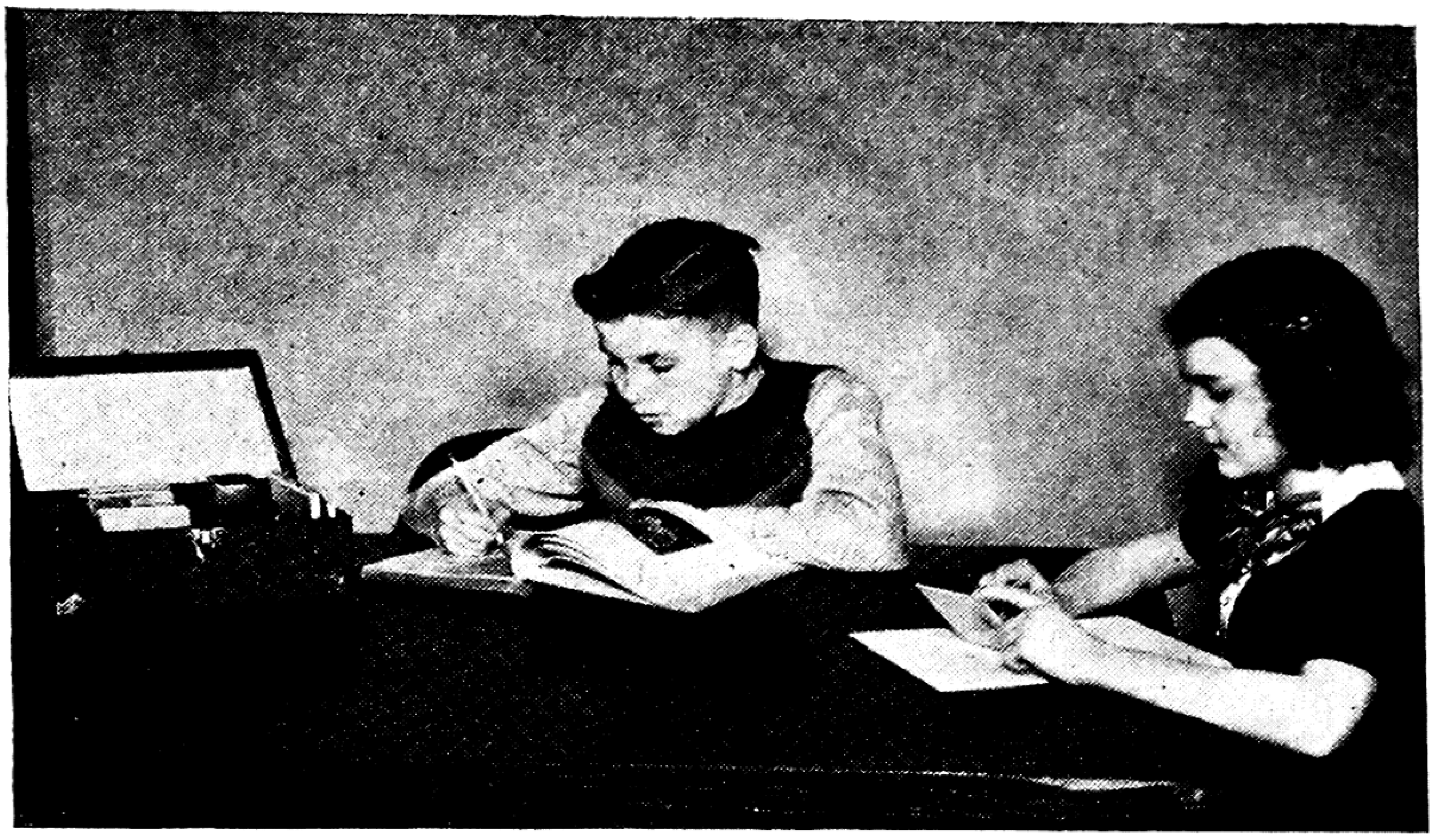
B. British standard glass slide

C. American standard glass slide

Slide Making. Glass slides are so easy to make that even primary children can do them satisfactorily. Slides should be made and used for definite purposes, always in connection with the work that is being studied. Not only will slides assist in clarifying ideas about the unit of work which the class is studying, but they will provide a means for self-expression.

Slide materials are inexpensive. The chief materials are plain and etched glass, binding tape, cellophane, colored pencils, and colored inks. Other materials may be used but these are the chief ones.

Etched glass is simply a piece of high-grade glass, one side of which has



These pupils are making glass lantern slides. They will share their learnings with their classmates in discussing their work. They may have an opportunity to present their slides in connection with an assembly program.

COURTESY OF KEYSTONE VIEW COMPANY

been slightly roughened, or etched by an acid treatment. Etched glass is quite commonly used when drawings or writings with crayons or ink are to be applied directly to the glass because the ink will not run and finer edges can be achieved. Pencil drawings can also be applied to etched glass.

Another type of glass, which is used, is a plain glass with a very thin gelatinous coating on one side. This glass, called a plate, can be purchased, or plain glass may be treated with a dilute shellac or glue dissolved in water. Cooking gelatin will serve. The advantage of this type of plate is the ease with which one can write upon it.

Types of Pupil-Teacher-Made Slides. With a little practice teachers and pupils often show great ingenuity in slide making. To give some idea of the types and techniques involved, the ten commonest types are discussed in detail in Appendix A. They are all relatively easy to make, but do not have equal usefulness.

Photographic Slides. In addition to the handmade slides discussed above, there are photographic slides which are printed on sensitized glass. This type of slide is the one furnished by commercial slide companies, but teachers will not find it difficult to make their own. For the teacher who has never developed her own camera negatives or printed her own pictures, this type of slide poses problems, but they are only the problems of photographic processing.

Photographic slides are made on glass plates coated with an emulsion similar to that used for making film negatives. The plates are developed, fixed, washed, and dried in the same manner as other photographic plates. After the plate is thoroughly dry, it should be projected in a lantern for examination. If it is satisfactory, it should be mounted for permanency.

Slides may be printed from negatives either by contact, reduction, or

enlargement. Since contact printing is the easier of the two processes, it is well to use a camera which accommodates a 2¼″ x 3¼″ negative. Reduction or enlargement is, therefore, unnecessary. Any negative which will make a good print will make a good lantern slide. The photographic slide is merely a positive print from a negative.

Making photographic slides necessitates the use of a dark room and apparatus. The method involved in making these slides is the same as that used in developing and printing of the regular type. Those interested in dark-room construction, apparatus, developing, exposing, or fixing should consult a good photographic manual for the steps involved. The Eastman Kodak Company has a simple manual on lantern slides which is free for the asking.

Lantern slides may be improved artistically and realistically by skillful coloring. They may be tinted slightly by soaking the plate in water which has been colored with Japanese water color stamps. Further coloring may be done with transparent water colors or Japanese water colors. The artist will find sufficient scope here for a challenge to his ability.

Utilization of Lantern Slides. Projected visual materials without sound and motion have multitudinous uses. Every ingenious teacher finds them useful in such a variety of ways that it is difficult to catalog them. One of their first values lies in the fact that they are group participation devices. Compare this with the clumsy method of the teacher's holding up a picture before the class, or his passing pictures among the class. In the first instance the picture is too small for all the pupils to see it clearly; and in the second, attention is divided with attendant confusion and loss of interest. Next in value is that slides provide interest and motivation. Third, they bring visual realism to the classroom. Pictures of far away places can be as real and accurate as the camera lens. They furnish materials which, in many cases, are far more meaningful than descriptive words. Fourth, they may provide recreation and even serve as a medium for creative artistic work.

Slides have been found valuable in developing educational experiences from the primary to the university level. They may be utilized by the teacher in introducing new units of work, to assist in the development as the unit progresses, or they may be used for summary purposes. In a demonstration lesson with a fourth-grade class, the teacher used a dozen slides to introduce the lesson, four or five slides

were used to show peoples and products during the body of the lesson, another half dozen were used in summarizing the lesson, and the lesson closed with a ten-minute quiz for which the questions were written on slides and then projected. Since it was not necessary to darken the classroom, the pupils wrote the answers to the questions just as they would have if the busy teacher had taken time out to write the quiz on the blackboard. In this lesson, the slides were woven into the lesson plan and used much the same as globes, maps, and sample products might have been used.

A teacher in a Pittsburgh vocational high school has found a unique application of glass lantern slides. "Cuts" and plates from school yearbooks, newspapers, and viewbooks are saved and slides are made from the engravings. Slides of these photographic materials can be used very effectively in vitalizing the school assembly, certain activity programs, and in connection with community public relations.[1]

Advantages of Slides. There is, of course, a time and place for each type of visual material, or as Shakespeare says,

> How many things by season season'd are
> To their right praise and true perfection!

Not all visual materials require motion for adequate presentation and study. The architecture of a fine Norman castle can be presented better through the use of the still-projected picture than through the use of the motion picture. In fact, motion pictures of this type of subject matter are in reality only a collection of still picture sequences. Motion is irrelevant.

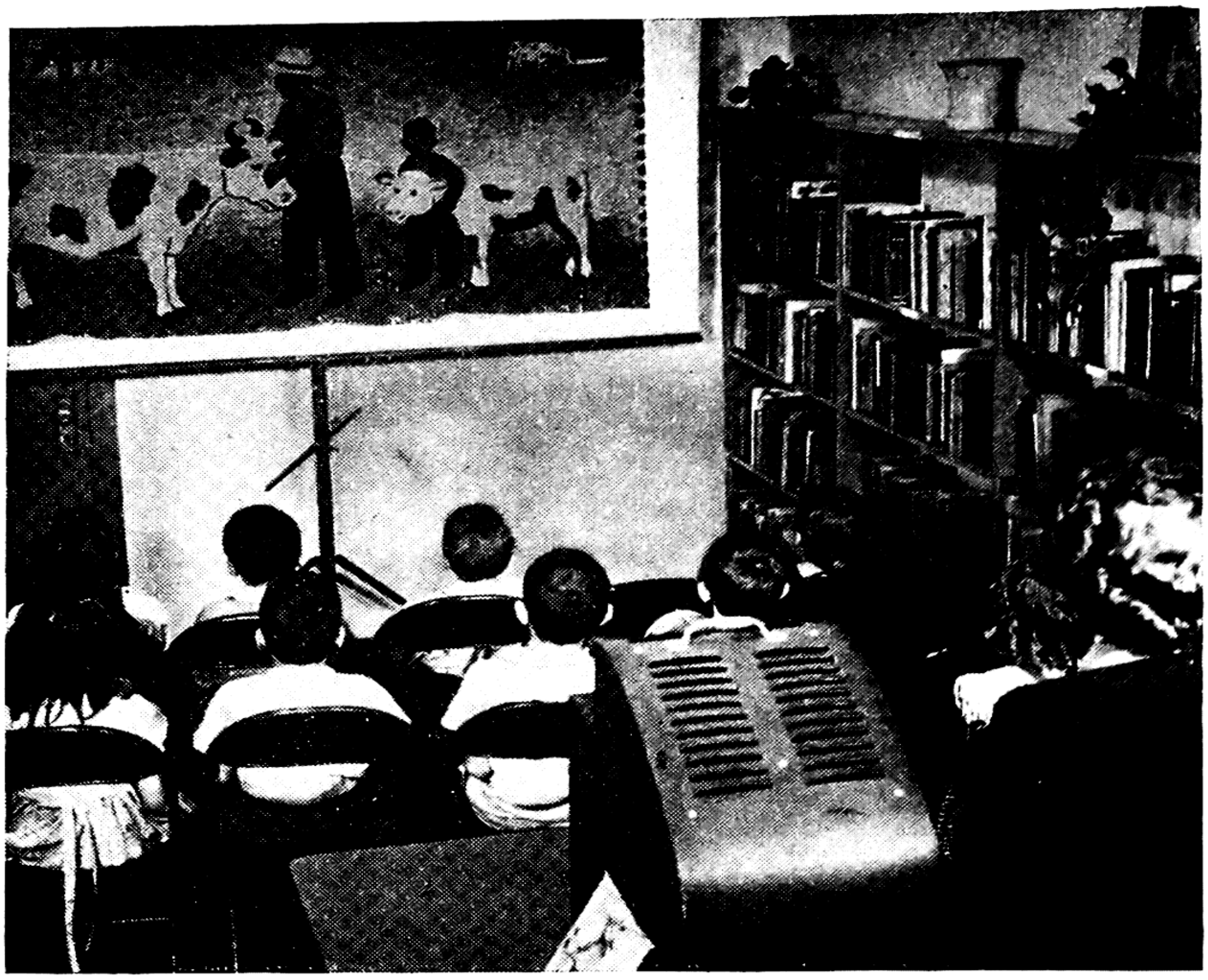
The glass slide projector is one of the most useful visual aids for the classroom teacher. It is easy to operate, relatively inexpensive, and the device lends itself to a variety of uses. Furthermore, it can be used advantageously with children of practically all ages and in practically all types of problem solving. It produces a brilliantly illuminated image under normal conditions and can, therefore, be used in a semidarkened room. In fact, for most classroom purposes, where the lantern is not too far distant from the screen, the room need not be darkened at all. This is, of course, all the more true if a short focal lens is used. Almost any sort of screen is adequate.

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[1]For description of the process see: Coyte, F. J., and Conner, D. W., "Vitalizing the Activities Program with Lantern Slides," *Pennsylvania School Journal,* 87: 273, April, 1939.

These pupils are viewing a projection of their own drawings.

COURTESY OF WEST HARTFORD, CONNECTICUT, PUBLIC SCHOOLS



The greatest advantage is to be found in the fact that slides may be examined at length by the class. Any amount of time may be used for observation and analysis of the picture with questions and discussions going on simultaneously. It is also easy to refer back to any picture which has been shown previously. Furthermore, pupils can take the slides in their hands, and even more important they can make many useful ones themselves in the classroom. This is an activity so worth-while that it should not be overlooked. Pupils should be encouraged to prepare slides to assist them in giving individual reports to the class because it will give the pupil confidence, provide greater interest, and usually enable the pupil to give a more meaningful report.

Limitations of Slides. Like nearly all other tools, slides, although effective teaching materials in general, have certain limitations. Some of these limitations have already been mentioned indirectly. Motion and action are essential qualities for some things, for example, a geyser. These qualities are lost in the slide. Again, the slide cannot portray the third space dimension. Only the stereograph can give the realistic impression of spatial depth and linear perspective. The particular disadvantages of glass slides are that they are easily broken and are bulky and heavy. It is appropriate to repeat that each type of visual aid has its definite advantages and limitations.

A general disadvantage of slides is that some teachers use too many and too much verbal accompaniment. This explains away much of the pupil

interest and curiosity. Pupils become passive receptors. It may also be said that teachers allow the use of slides to degenerate from an actual teaching device into a picture show. It should be noted, however, that such criticism is not specifically the criticism of the technique *per se,* but rather of the willful or ignorant abuse of the technique.

Other objections, raised particularly by art teachers, deal with the fact that since only one picture is before the students at one time, comparisons are difficult to make. A few schools try to overcome this by the use of two projectors, but the commonest method is to project alternately the two slides used in the comparisons. If, for example, the question involves two methods of plowing, this is satisfactory, but in the case of art, where two techniques as the use of perspective or line are concerned, the comparison is difficult. Art teachers, too, find the photographic copy of an art masterpiece rather unsatisfactory. The copy is usually black and white, or if color is provided it must be painted in by hand and falls far short of doing justice to the original. The 2″ x 2″ color transparency is a distinct advantage in this instance, yet fine shadings and nuances may be lost.

Criteria for Evaluating Slides. There are good slides and bad, although most of the commercial firms marketing slides exercise judgment in production. The characteristics of good slides are essentially the characteristics of good flat pictures with the exception of one or two mechanical qualities. These characteristics are:

Authenticity—Does the picture truthfully represent the situation as one might see it if one were permitted to visit the scene personally?

Simplicity—Is the composition simple enough to furnish a clear and definite impression of the main points in the picture? Does it present vividly what it portrays?

Relative Size of Items—Is there something in the picture whose size is known to the observer so that he can obtain a correct mental image of any new objects in the picture?

Action in the Picture—Does the picture, if of living things, show action as man or beast performing activities in his natural environment?

Photography—Is the photography sharp? Are lines and edges sharp? Was the slide properly processed so that it is neither too light nor too dark?

Artistry—Is the slide artistic in its general effect? Was it photographed from the proper angle? If there is color, is the color pleasing and natural?

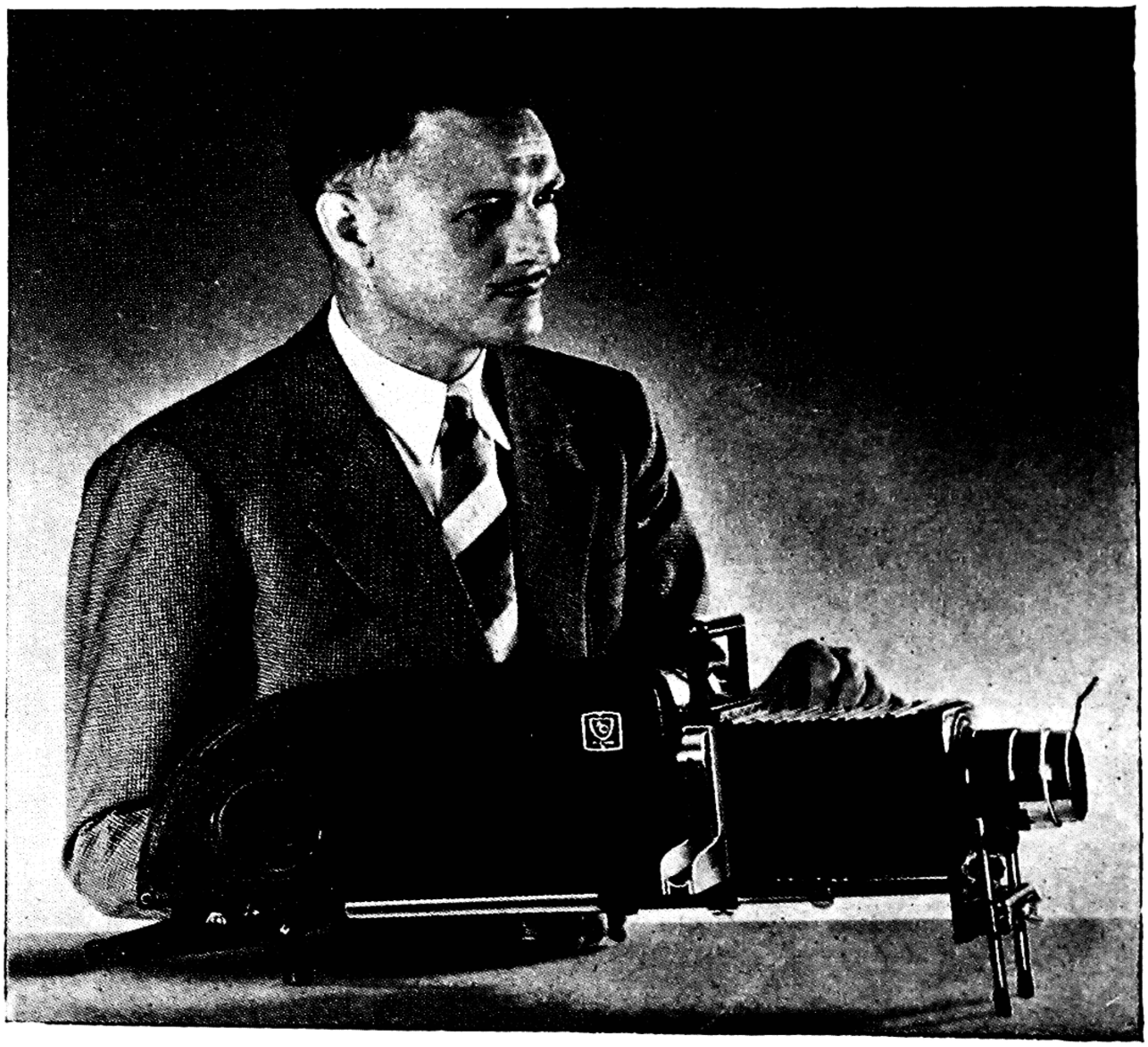
Mechanical Quality—Is the slide free from blemishes, smudges, scratches, and blurs? Is it substantially bound? Does it have a thumb mark? Is it captioned?

Teachers often have occasion to rate slides. The rating scale on page 172 has been found helpful for this purpose.

THE SPECIAL "2 X 2" PROJECTOR

In the last few years there has been an unusual growth in the use of the small slide, 2″ x 2″. It has many advantages over the standard slide. Chief among these are cost and flexibility. The 2″ x 2″ slide is actually a film positive or a positive transparency mounted between two pieces of glass, or enclosed in a surrounding paper mount. In fact most 2″ x 2″ slides are now paper mounted, and this is quite satisfactory in spite of the fact that the film is actually unprotected.

Large numbers of teachers are making their own 2″ x 2″ slides. Pictures are taken with a 35-mm. camera using either color or black and white film. After exposure the film is processed and is ready for pro-



A Typical Slide Projector

COURTESY OF AMERICAN OPTICAL COMPANY

Quality	Score or Rating	Explanation
I. Slides, considered individually (85)		
Enrichment	15	Does the slide enrich learning? Does it possess characteristics which the teacher can use to enlarge the pupils' experiences?
Purpose	15	Is the theme purposeful? Is it within the level of pupils' understanding?
Authenticity	10	Are the facts in connection with the slide content authentic to the best of your knowledge? (Reputation of the slide maker or producing company is important.)
Interest	10	Will the slide interest pupils? Will it raise questions? Is it more than a pretty picture?
Truthfulness, size, setting	10	Does the slide represent truthful situations? Is it natural? Is it typical or unusual? Is size of objects in the picture balanced? Is there anything in the picture by which an intelligent comparison of size is possible?
Color	5	Is color a necessary element of this subject? Is the color truthful and artistic?
Enjoyment	5	Will it evoke a wholesome emotional reaction?
Technical quality	15	Is the slide clear, neat, free from blemishes, properly labeled and marked? Are details sufficiently clear to be of value?
II. Slides, place in a series (15)		
Unity	10	Will the slide fit into a series and tend to unify the set?
Organization	5	Will the slide add to the general significance of a set?
Total Value	100	

A Rating Scale for Lantern Slides

jection. This is an extremely economical way for a teacher to prepare her own visual materials; and with the present development of color film, colors which are rich, vivid, and realistic are easily captured. The merits of the use of color are often argued pro and con, but color is coming to be a part of classroom materials, particularly in motion pictures, general readers, bulletins, flat pictures, and slides.

Alert teachers who have their cameras with them on trips or vacations may bring back the finest type of teaching materials. Wheat harvesting or the fishing industry, for example, may be photographed and later used in classes with excellent results. School journeys can be recorded photographically and become a permanent part of the work of the students.

Excellent slide libraries are in existence in hundreds of schools. Thousands of teachers have their own collections. These slides have been purchased from supply houses and cover world-wide topics. Local materials are photographed by the teachers, edited and arranged in series, and in some cases schools, teachers, or committees have written discussion guides or manuals to accompany them.

Special 2″ x 2″ projectors cost about half as much as the standard slide projector. There are also many combination projectors available today. For example, one projector will project either 3¼″ x 4″ or 2″ x 2″ slides, merely by changing the slide carrier. Another projector will handle 2″ x 2″ slides and filmstrips. And still another machine will project opaque material, all sizes of slides, and, with an added adapter, filmstrips. Budgetary considerations will probably decide the type of equipment to purchase. By and large, the special purpose machines give better results than the multi-purpose ones.

FILMSTRIPS

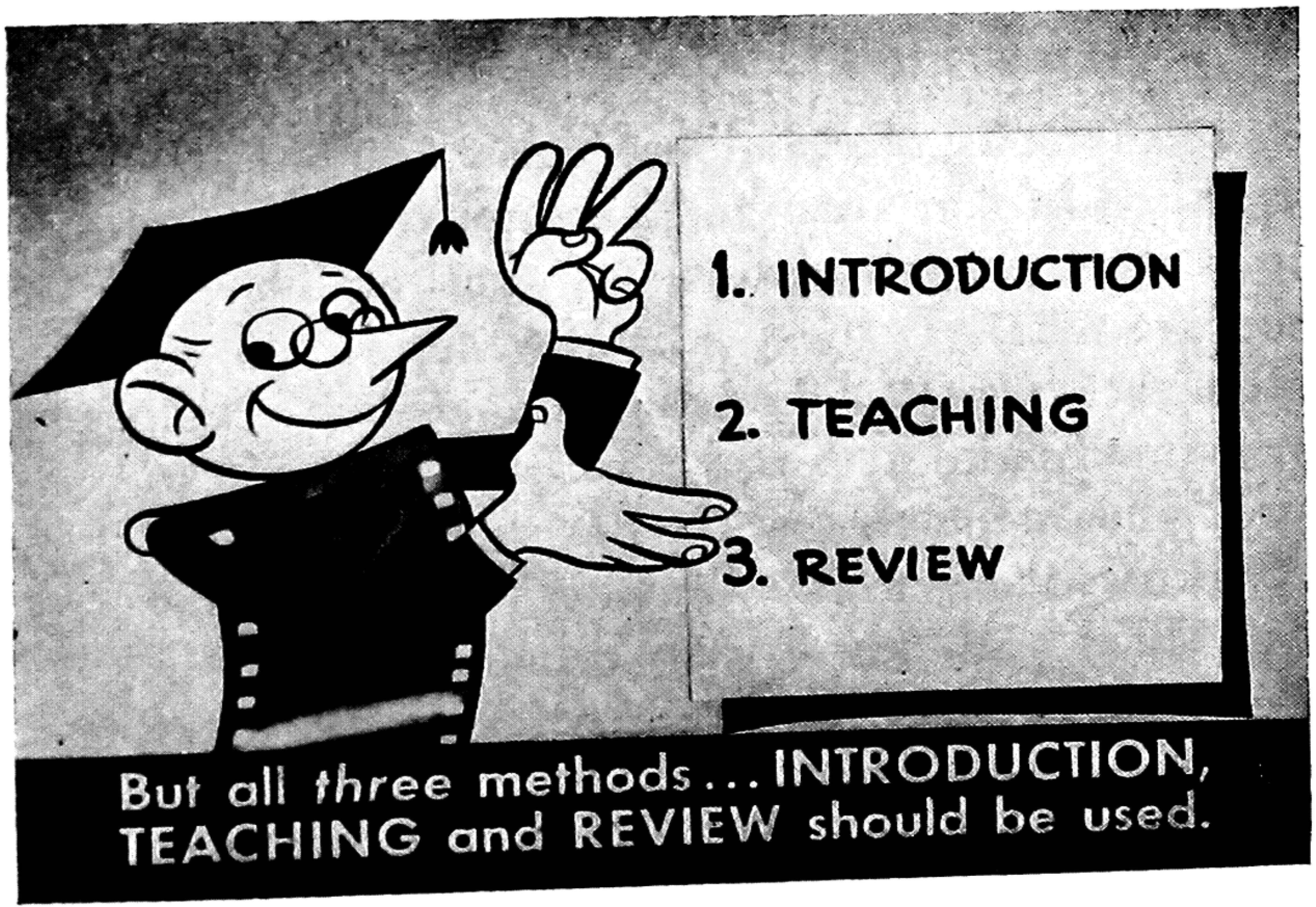
One of the latest additions to the list of visual materials is the filmstrip with its projector. It was introduced in 1920 and has grown rapidly in popularity. The filmstrip is merely a roll of film with positive images. Special filmstrip projectors are relatively inexpensive and are small and compact. The filmstrip projector is usually a dual purpose machine which will also project 2″ x 2″ mounted slides. It is also possible to purchase attachments to be used on regular stereopticons for the showing of filmstrips, or a school may construct its own attachments. This is done by mounting two glass cover slides with transparent cement, leaving an

opening for the filmstrip to pass through. With a little experimentation a satisfactory device can be made, yet, to be hardheadedly realistic, one must admit that truly good results can be obtained only with a projector built specifically to project filmstrips.

The filmstrip is referred to in the literature under a variety of names, such as filmslide, stripfilm, stillfilm, or slidefilm. All of these refer to a series of pictures printed on positive 35-mm. motion-picture film. A filmstrip is arranged in frames and each frame is a separate picture which measures ¾″ x 1″. Filmstrips vary in length, but they are so compact that a strip containing fifty or seventy-five pictures occupies only a half dozen feet of film and is about the size of a spool of sewing thread.

Filmstrips come in two picture sizes: the single frame and the double frame; both use 35-mm. film. The single frame is the more widely used and gives the ¾″ x 1″ picture already mentioned. This picture is photographed with the width of the picture across the film, and is then run through the projector vertically. Double-frame pictures are 1½″ x 1″ and are printed so that the width of the picture is along the length of the film, which is run through the projector horizontally. Some of the special projectors are arranged with swivel-heads so that pictures may be shown vertically or horizontally.

Most of the filmstrip material will be found in the two sizes just mentioned. There is a third size, also. It is possible to use a filmstrip of standard glass slide size, 3¼″ x 4″. This film is attached to spools and is used in the stereopticon by means of a simple roll attachment to replace the slide carrier. This 3¼″ x 4″ filmslide may be purchased or made in school from heavy cellophane with drawings or descriptive matter placed thereon



A "Still" from a Filmstrip. Used in the classroom

COURTESY OF YOUNG AMERICA FILMS, INC.

with India ink. The "frame" is sufficiently large to permit easy work in the making of graphs and maps, or pictures forming a sequence in projects in history, literature, science, and other subjects.[2]

Advantages and Disadvantages of the Silent Filmstrip. Silent filmstrips are growing in popularity and general use. They are exceedingly flexible in use and are excellent for prolonged study and discussion. Their cheapness and ease of projection add to their popularity. They are usually purchased by the school and are then available at all times for teachers to preview and study before use in the classroom. Commenting on this visual medium, the former director of audio-visual education of the National Education Association says:

> The silent filmstrip is not a succession of disassociated slides; it should be thought of as an adaptation of the silent motion picture, because of its continuity in both pictorial and verbal presentation. Also, it is not just an illustrator of nouns. Silent filmstrips are effective in presenting many *activities*. In fact, this medium capitalizes upon the elimination of irrelevant—and often distracting—motion by showing only the pertinent characteristics of each detailed step in a procedure.[3]

1. Advantages of filmstrips:
   a. Economical, both as to projectors and films
   b. Compact, light of weight, easy to file and store
   c. Easy to maintain, no breakage
   d. Simple to project
   e. Easy to prepare illustrative material for classroom projection by teachers
   f. Effective for recording projects for future use
   g. Adaptable to direct use of color
   h. Effective in presenting cutaways, phantom views, diagrams, and schematic drawings
   i. Valuable for prolonged study and discussion
   j. Flexible, rate of presentation can be varied at will
2. Limitations of filmstrips:
   a. Pictures are in a definite sequence and an individual frame cannot easily be singled out for projection

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[2]The reference to Bonar at the close of this chapter tells how these large filmstrips can be made in the school.

[3]Dameron, Vernon G., "Wanted: A Broad Concept of Audio-Visual Instruction," *Educational Leadership*, 3: 140, December, 1945.

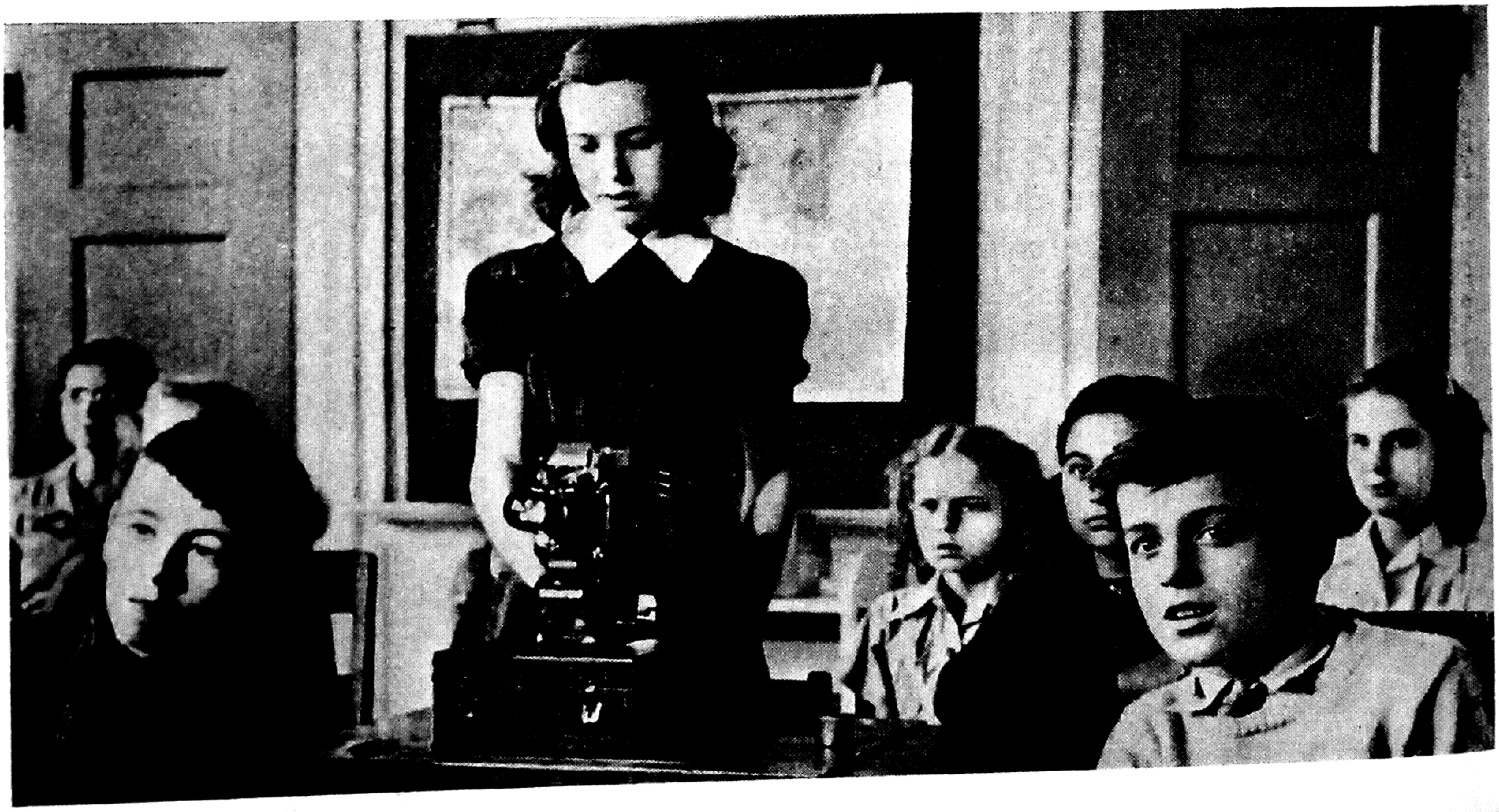
b. Cataloguing is difficult because one strip may contain pictures dealing with several subjects
c. Projectibility not always good, films often too dense to allow proper illumination
d. Rooms must be darkened for best projection
e. Screens of good quality are essential
f. Pictures are unprotected and are easily scratched and marred

Utilization. Tabler found the filmstrip to be one of the fastest growing of all visual materials in use. He predicts that its use will expand ten times in the next decade. Using a weighted formula, Tabler found the 2″ x 2″ slide and filmstrip now rated at 1:500 to have an anticipated 1957 rating of 1:50. He goes on to say that the standard rating *should be* 1:5.[4]

Filmstrips may be used successfully in any situation in which a still projected picture is the best educational medium to assist in teaching a particular thing. Consequently, filmstrips are not only pertinent tools for use in schools, but also in churches, clubs, discussion groups, industrial training or military training. Schools have found the filmstrip a successful medium ranging from the primary grades to the university. Many famous

[4] Tabler, C. H., "The Next Decade of Audio-Visual Use," *See and Hear*, 3: 17–20, December, 1947. These ratios should be read 1 classroom use in 500 classroom situations in 1947, etc., in the 100 cities used as a criterion in the study.

This girl is using a filmstrip to illustrate a class report.
COURTESY OF NEWARK, N.J., PUBLIC SCHOOLS



children's stories have been filmed on strips. Sequences from history, agriculture, nature study, science, vocational guidance, and shop practice, are available for intermediate grades, and for junior and senior high schools. The structure of the United Nations, world trade conditions, causes and effects of war, and similar topics are ready for college and adult study. The wealth of material now available on filmstrips will surprise those who have not kept in close touch with this development.

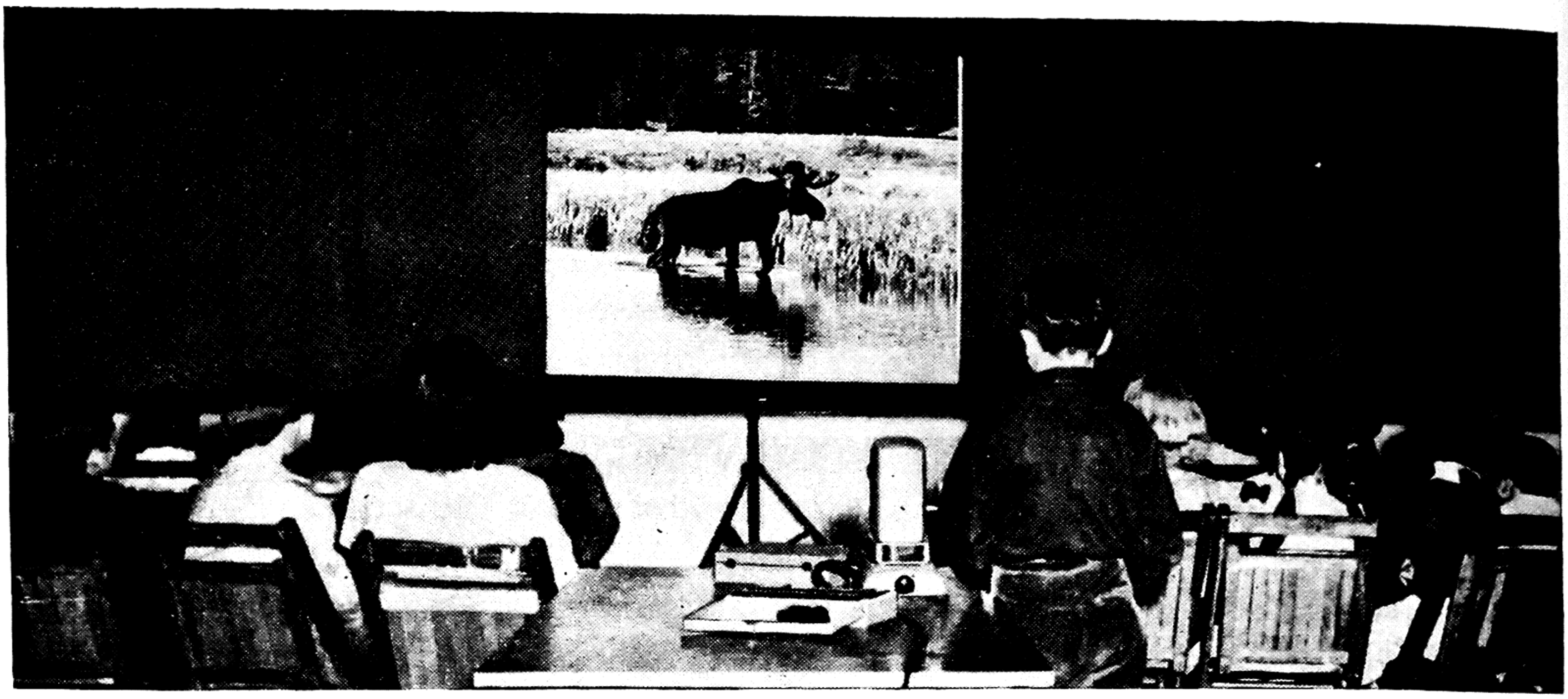
Techniques in using filmstrips are approximately the same as those for the use of slides, or even motion pictures. Actually, a good lesson making use of visual materials is very much the same as any other good lesson. Effective lessons provide for objectives, set up problems to be solved, suggest techniques for solving the problems, and lead the class to make some generalizations. Throughout this process there should be discussion, reading, research, debate, review, experimentation, and other kindred procedures. One does not learn merely from looking at pictures, reading, writing, tinkering, or drawing; he learns when he reacts to stimulating forces which play upon him. From the reactions (usually the more varied the better) a new behavior pattern emerges.

Administrative Considerations. Stress has already been placed upon the flexibility and the economy of the filmstrip. When filmstrips are purchased outright they will cost from $2 to $5 per strip of forty to eighty pictures. Strips made in the school or by the teacher will cost about the same. Of course, the advantage with teacher-made filmstrips is that there can be a documentation of local environmental influences which may not be available otherwise.

Little space is needed for storing filmstrips. The title of the strip on the top of the can makes locating the proper can easy. Filmstrips do not deteriorate easily, and need no special cases or vaults. Expenses in shipment are the lowest possible—a single can may be sent through the mails for three cents.

Filmstrip projectors are easy to operate—even intermediate grade children can operate them. And, after projection, there is no complicated inspection of the rolls required.

Finally, should the teacher, for some reason, prefer slides instead of filmstrips, the strips may be cut apart and the frames mounted as slides. A strip which has been damaged may often be salvaged by cutting it up into a set of slides.



COURTESY OF BATTLE CREEK PUBLIC SCHOOLS

These students have set up a filmstrip projector in the gymnasium.

Filmstrip, Textbook, and Motion Picture Correlation. Some interesting recent developments in correlating filmstrips, textbooks, and motion pictures have taken place. Several textbook publishers are now producing filmstrips integrated with their basic readers and other texts. Other textbook publishers have gone a step farther and have produced both sound motion pictures and silent filmstrips correlated with their textbooks. This development of the "textfilm" bids fair to start a mild revolution in educational materials. Some of the major educational motion picture producers, since they have no textbooks of their own, are busily engaged in trying to work out correlations between their existing film productions and major textbooks. Thus, a very interesting link is being forged. Publishers are trying to show how existing films correlate with their books, and film producing firms are doing the same thing from their angle. During the war, the United States Office of Education pioneered in this development and produced several hundred sound motion picture films on shop and management subjects. Each film was accompanied by a filmstrip and a manual. The thinking back of this plan was (1) the motion picture film would present dramatically the information and operations necessary to do a certain job, for example, how to read a blueprint; (2) the filmstrip would emphasize and review the salient points in the film; and (3) the manual would suggest to the instructor ways to use both the film and the filmstrip, and possibly give other information needed to do the best teaching job. The three materials were used as a team. Here is the way one USOE manual suggested using the filmstrip:

Use the filmstrip to review and clarify parts of the motion picture.
Use it again after the trainees have had some experience reading blueprints.
Use only the parts that apply to your group.
Adapt its contents to the actual practices in your school or shop.
Use it more than once. You can select certain pictures for oral review.
Use it to develop a working vocabulary that will help orient the trainee to his job.
Use it to introduce related information which will help your trainees understand the "knowings" and "doings" of the job.
Allow trainees to use the filmstrip by themselves to clear up or review points in the motion picture.
Ask additional questions on the various pictures to stress important points in blueprint reading.[5]

Sound Filmstrips. A filmstrip which has a synchronized sound recording accompanying it is called a sound filmstrip. It has already been explained that the filmstrip is a continuous strip of 35-mm. film with individual pictures, called "frames," arranged in sequence, and usually with a series of explanatory titles interspersed throughout the film as needed. For reasons of economy, the explanatory frames may be omitted from the filmstrip and be included in a manual to accompany the strip. The sound filmstrip uses a synchronized record with the strip. A lecturer or narrator explains the pictures one by one. A faint ring of a bell, also on the record, tells the operator to change to the next frame on the strip.

[5] *Sectional Views and Projections, Finish Marks,* Machine Shop Work Series, Fundamentals of Blueprint Reading No. 4, Visual Aids Unit Instructor's Manual, United States Office of Education, 1944.



Sound filmstrips are important audio-visual aids in the classroom.

COURTESY OF STATE UNIVERSITY OF IOWA

Sound filmstrips are to still projected pictures what sound films are to motion picture. As a teaching medium, the sound filmstrip carries a double impact. It appeals both to eye and ear.

After its introduction commercially in 1931, the sound filmstrip became almost the exclusive equipment of business and industry. Six out of the seven leading automobile manufacturers used it for training employees, and for promoting sales, and safety campaigns. During World War II, the device was given rigorous tests by the Army and the Navy. Unusual claims were made for its effectiveness as a teaching aid. Schools have never used it to any considerable extent, although there is every reason to believe that it will see wider use in the future.

The apparatus consists of a silent filmstrip projector with a turntable attached on top. Operation is accomplished by threading the projector, then starting the turntable. The recording tells the operator when to turn the filmstrip to the next frame.

OPAQUE PROJECTION

One of the greatest handicaps in using pictures, illustrations, charts, sketches, diagrams, and other flat or near-flat materials in the classroom lies in the fact that they are too small to be seen by more than one or two students at a time. This handicap is easily overcome by projecting these materials in an opaque projector. This projector, by using a system of mirrors with a proper lens, reflects the image of the picture or object onto a screen of a desired size so that group viewing and discussion are practical.

Naturally, a projector of this type has many advantages. Materials to be projected need not be photographed or put on slides; they can be projected directly from books or magazines. Post cards, small maps, even small objects or specimens project easily. A special opaque projector is necessary. Some models will accommodate materials up to 8½ by 11 inches in size, and the images produced have the colors of the original. This projector costs approximately the same as a stereopticon. Several projectors are available which combine opaque and slide projection.

As with other types of visual materials and equipment, the opaque projection has a special and unique place. It does not replace any other device; rather it complements other devices. No school which attempts to do a thorough job of visual instruction can dispense with this particular tool.

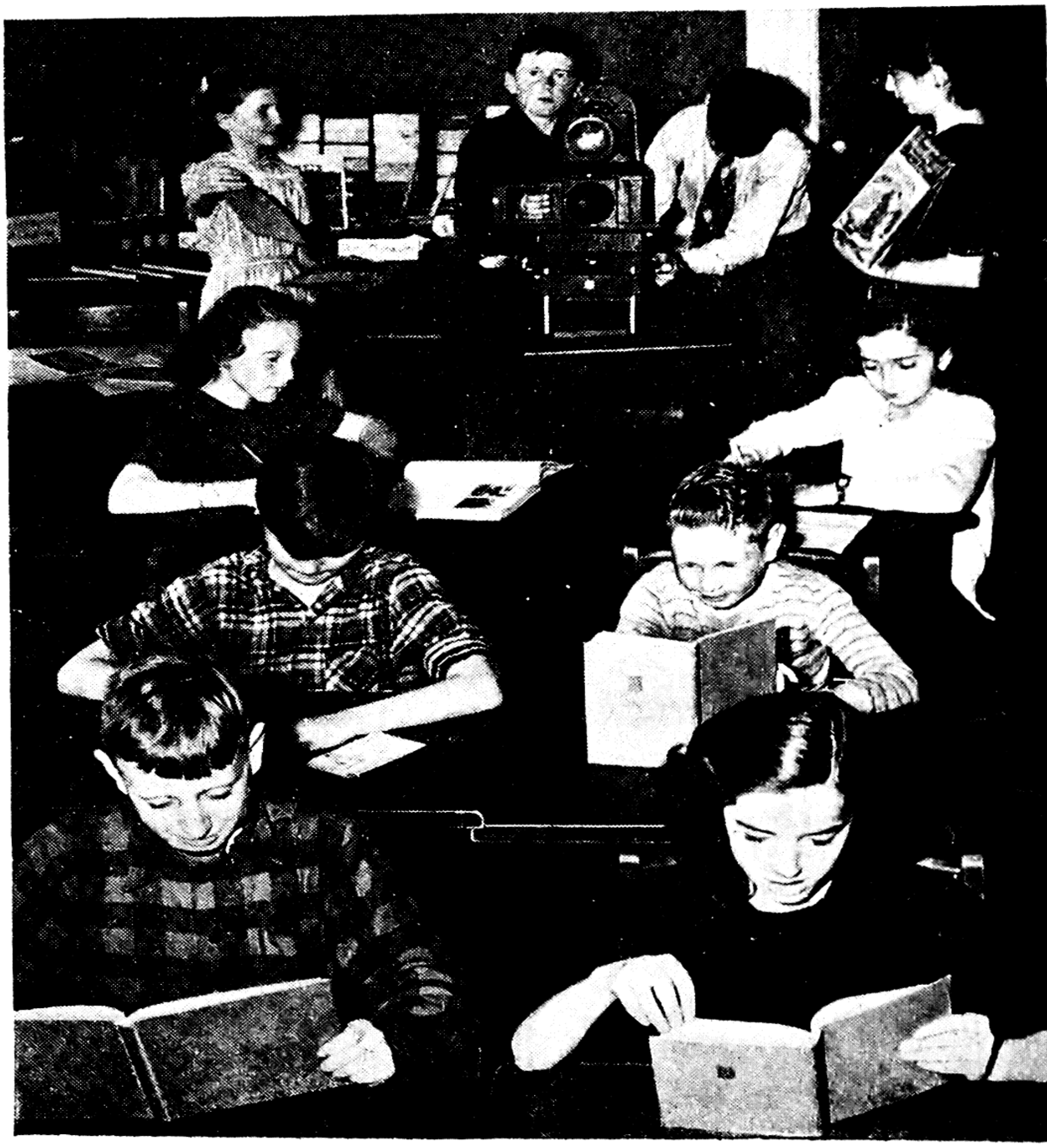
Aside from use in school, the opaque projector is widely used by the Armed Forces for instructional purposes. It has not been widely used by industry because it requires a dark room for good results. It is a nontransparent projection depending upon reflection.

Utilization. Speaking of the opaque projector, Miller says, *"If there is a limit to suggestions for uses for the opaque projector, it is the limit of the imagination and versatility of the teacher."*[6] No one who has used this projector would challenge Miller's statement, and a few brief suggestions will show the types of materials which can be effectively used at various grade levels.

Primary Grades: (1) pictures and words put together for reading-readiness drill, (2) dominoes or cards with dots used for number study, (3) simple instructions or directions for the class printed on cards, such as "Doris and Bobbie may feed the pets."

Intermediate Grades: (1) art work, (2) compositions, (3) handwriting,

[6]Miller, Clyde K., "Reviewing a Semester of Opaque Projection," *The Educational Focus,* 19: 20, February, 1948.



These grade-school children operate their own opaque projector. Note the illustrated textbooks and the reference-museum table in the background.

COURTESY OF WEST HARTFORD, CONNECTICUT, PUBLIC SCHOOLS

(4) science pictures—birds, insects, planets, machines, structures, (5) domestic science.

High School: (1) compositions, (2) art, (3) shop drawings, (4) science, (5) shorthand techniques, (6) ledger entries, (7) projections, (8) blueprint reading, (9) charts and graphs.

All Grades: (1) musical scores, (2) safety, (3) photographs and illustrations, (4) peoples of other lands, (5) spelling, (6) maps, (7) tests and reviews.

College and university teachers find the opaque projector valuable as a teaching device for the same reasons that it is valuable to elementary and high school teachers.

Although exceedingly versatile as a teaching tool, the opaque projector is not widely used. In a study at Gary, Indiana, it was found that the reason for this lies in the fact that teachers simply were not familiar with the projector.

A series of demonstrations by the director of audio-visual education in Gary resulted in 26.65 per cent of all the teachers in the system using the opaque projector.

To achieve greatest success with the opaque projector, the teacher should have facility in operating the machine and should have her materials easily accessible and in order. Best results are achieved when illustrations covering a topic are arranged as a unit with a definite sequence. There are several ways to do this. First, the pictures may be stacked one on another in the order in which they are to be shown. All pictures should be of the same size so that they can be inserted in the projector with a minimum of juggling. The pictures should be mounted on cardboard so that they do not curl or buckle. Focus is much sharper with mounted pictures.

A second method is to mount the pictures on cards, uniformly 8 by 8 inches in size, and then to hinge the cards together in a folded set. By folding the pictures back and forth in accordion style, a useful arrangement of the materials is achieved.

The third arrangement is to paste the pictures, evenly spaced, on a long strip of shelf or wrapping paper. The strip is inserted in the projector and pulled sideways from picture to picture. The ends of the strip can be rolled so that the assembly is easy for the operator to handle.

Regardless of method of preparing the materials for use, they should be labeled and filed after use. The folded card style is one of the easiest

forms for filing. These materials will fit into manila folders or envelopes and can be kept in an ordinary filing case.

Practical Considerations. The advantages of this type of projection are:

1. A wide variety of materials can be projected, materials which would not be available otherwise or would be difficult and expensive to obtain in transparent form. Thus the teacher may desire to use some illustrations from such magazines as the *National Geographic*. Pictures may be cut out and mounted or the open magazine may be inserted in the projector.
2. Aside from the original cost of the projector there is little expense involved. Materials are either collected or drawn.
3. Colored pictures can be shown with their original brilliancy. This is valuable to art teachers especially.
4. Materials are not injured and may be shown over and over again if care is exercised.
5. Specimens such as stamps, coins, or leaves, mounted or unmounted, may be projected without loss of color detail.
6. The opaque projector and lantern slide make an ideal combination for the teacher's use in either type of projection, permitting changes instantly. All that needs to be done to switch from one to the other is to raise or lower a lever.

The disadvantages of this projector are:

1. Since the material to be projected is opaque and is reflected, there is a consequent loss of intensity of illumination. This means that the classroom needs to be well darkened. It also generally requires that the projector be placed nearer the screen than in other types of projection in order to attain clearness and sharpness of image.
2. Unless the projector is equipped with a fan, it becomes quite hot during extended projection. Operators need to be careful to escape burnt fingers, and materials placed in the projector may be injured by the heat. Paper will curl and may even be discolored. The newer types of projectors, equipped with cooling systems, have overcome this limitation.
3. The older opaque projectors were large and cumbersome, although not heavy. Newer models have been streamlined.

MICRO–PROJECTION

Micro-projection is an efficient and useful device and is of greatest service in connection with work in which the individual microscope is used. Teachers have always been concerned about what the pupil saw when he peered into a microscope. The problem is solved by the micro-projector because the view is flashed on a screen. Economy is also achieved because the micro-projector makes it unnecessary for each individual student to have a microscope. Thus, the micro-projector is useful and economical when contrasted with the cost of providing many microscopes and keeping them in good working order.

Micro-projectors may be purchased as separate special projectors, or an inexpensive attachment to the regular stereopticon can be used. A third device is the regular stereopticon in combination with a microscope. The under side of the stage of the microscope is placed directly against the focusing lens of the stereopticon, after the microscope is bent back to horizontal position. The technique of operation is, then, similar to that of the lantern or filmstrip.

Slides are prepared of animate or inanimate structures for projection. Inanimate substances such as textile fibers, tissues, compound eye of insects, a proboscis, mold, crystal structures, or cross-sections of leaves, wood, rock or stems are commonplace examples. Live aquatic specimens may be placed in a glass trough or "life slide" containing water or glycerine, and then projected. Protozoa project easily. Circulation of the blood in the veins of the distended foot of the frog or in the tail of the tadpole can be projected to the screen. Care must be exercised with live specimens to prevent them from being killed by the heat from the projector. Teachers have shown great ingenuity in projecting live specimens and organic functions. For instance, a demonstration can show the effect of disinfectants or germicides on living matter. Capillaries, veins, and circulation take on new meaning when seen in reality.

Some difficulty may be experienced in obtaining good illumination because the micro-slide allows only about one-half inch of light to pass through it. This makes it necessary to place the projector relatively near the screen to achieve proper illumination. Of course this reduces the size of the image. (The greater the distance of the projector from the screen, the larger the image but with diminished illumination. Light diminishes inversely as the square of the distance of the projector from the screen.)

A good quality screen is a necessity and the room must be dark. The best projection is obtained when the projector is not more than six or eight feet from the screen. Many instructors prefer to use a translucent screen with the projector back of the screen instead of in front. Several advantages are gained by this technique. The room need not be in total darkness, and the teacher is in front of the class or at the projector just back of the screen, thereby being in a more strategic position to point out details in the projection. On the other hand, since light must pass through the translucent screen, it is not as brilliant as on a glass-beaded reflection screen.

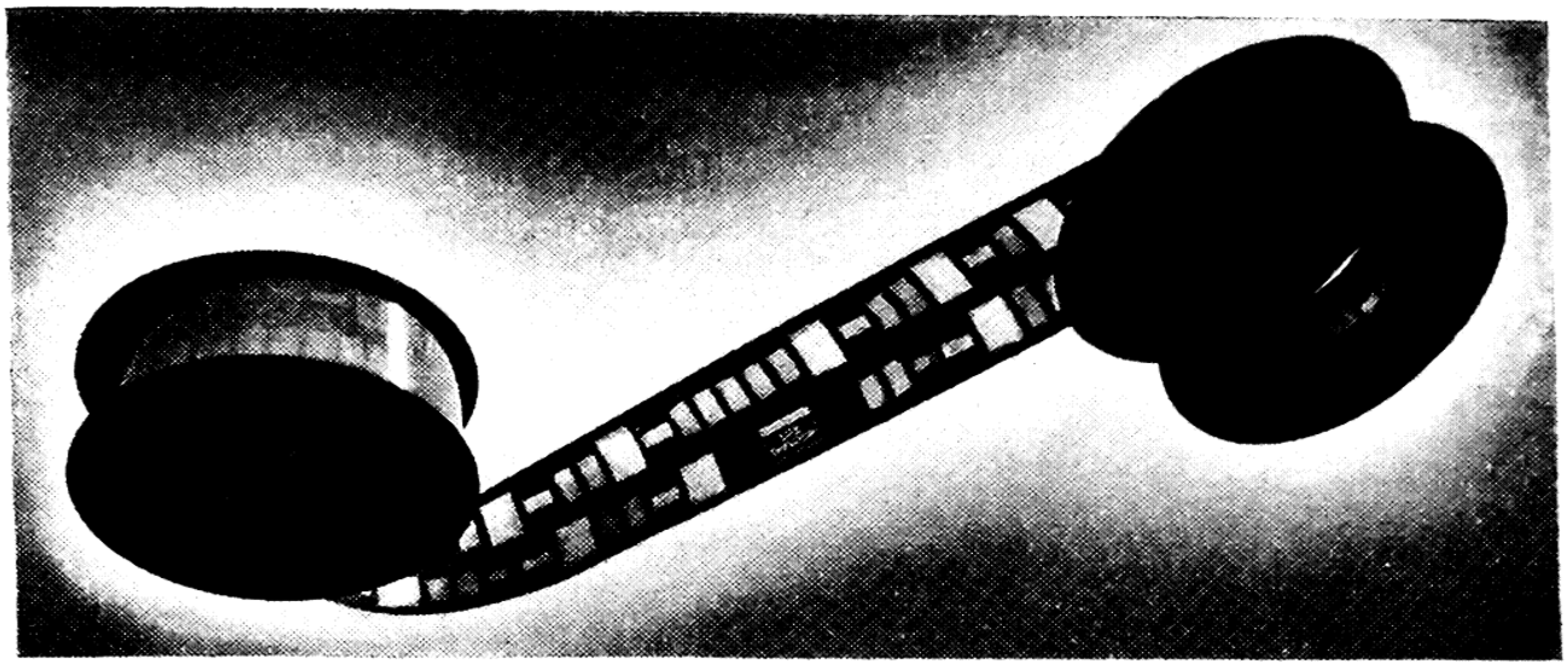
One high-school teacher, who has used micro-projection in his science classes for several years in a small high school, lists eight advantages of this tool:

1. It eliminates the need for more than one microscope.
2. It eliminates the possibility of faulty focusing on the part of the pupil.
3. The attention of the entire class can be focused on one image at the same time.
4. Much of the pupil's and teacher's time is saved.
5. The pupil realizes that he is observing something real rather than a picture.
6. Class discussion can go on while observation is being made.
7. There is no limit to the observations that can be made by many pupils at one time.
8. One prepared microscope slide will do the work of twenty [microscopes], and will, at the same time, do it more effectively.[7]

MICROFILMS

Although the use of microfilm is only indirectly related to the educational process, it seems appropriate to include a brief discussion of this new film process. Up to 1935 the reproduction of printed pages was done chiefly by letterpress, offset lithography, multigraph, mimeograph, hectograph, or photocopying. All of these processes are useful, but each has certain limitations when only a few copies are needed. Some of them are expensive, some are cumbersome and bulky, and others involve

[7]Wimmer, Merle, "Microscopic-projection and Micro-photographic Slide Making," *Educational Screen*, 18: 9, January, 1939.



The entire contents of a four-drawer filing cabinet have been photographed on this spool of microfilm. Consider the space saved by this device.

COURTESY OF DIEBOLD, INC.

the making of plates or the cutting of stencils. The need existed for a method of reproduction of page material, manuscript, or other copy which was compact, exact, and flexible in use. Microfilm is the answer.

Microfilm is 16-mm. or 35-mm. film which has been exposed frame by frame to successive pages of books, manuscript, or graphic material. After photographic processing, the images on the small frames are exact facsimiles of the original. A frame of 16-mm. film is about the size of a postage stamp and the 35-mm. frame is only ¾″ x 1½″. The image on the film is read by use of a magnifying glass, an enlargement on a screen of a reading machine, or an enlargement on photographic paper. Unlike motion pictures each frame carries a different image. The original copying or photographing is done with a candid camera or a special copying camera. The whole process is inexpensive.

Many uses for microfilm come immediately to mind. Chief among them are the savings in space where voluminous records are kept, as in various governmental offices, newspaper files, library stacks, hospitals, or banking concerns. Scholars the world over have found the device a boon in research. Extended copying of passages is no longer a necessity; neither is it necessary to go to the great libraries to read the book or to try to arrange for personal or interlibrary loan. The needed book may be microfilmed at small cost and sent through the mail to the scholar. Costs range from one to three cents per page. All the larger libraries, and many small ones, are equipped with reading machines. Reading machines are small boxlike devices in which the film is inserted and the image reflected on a screen built into the front of the device. Pages are shifted by simply turning a crank which brings up the next frame of film. Reading devices are available with different sizes of screens so that the microfilm frame may be enlarged to the exact size of the original or even larger. Rare books in foreign countries can easily and inexpensively be made available anywhere in the world.

The amount of microfilming which is done each year is astounding to

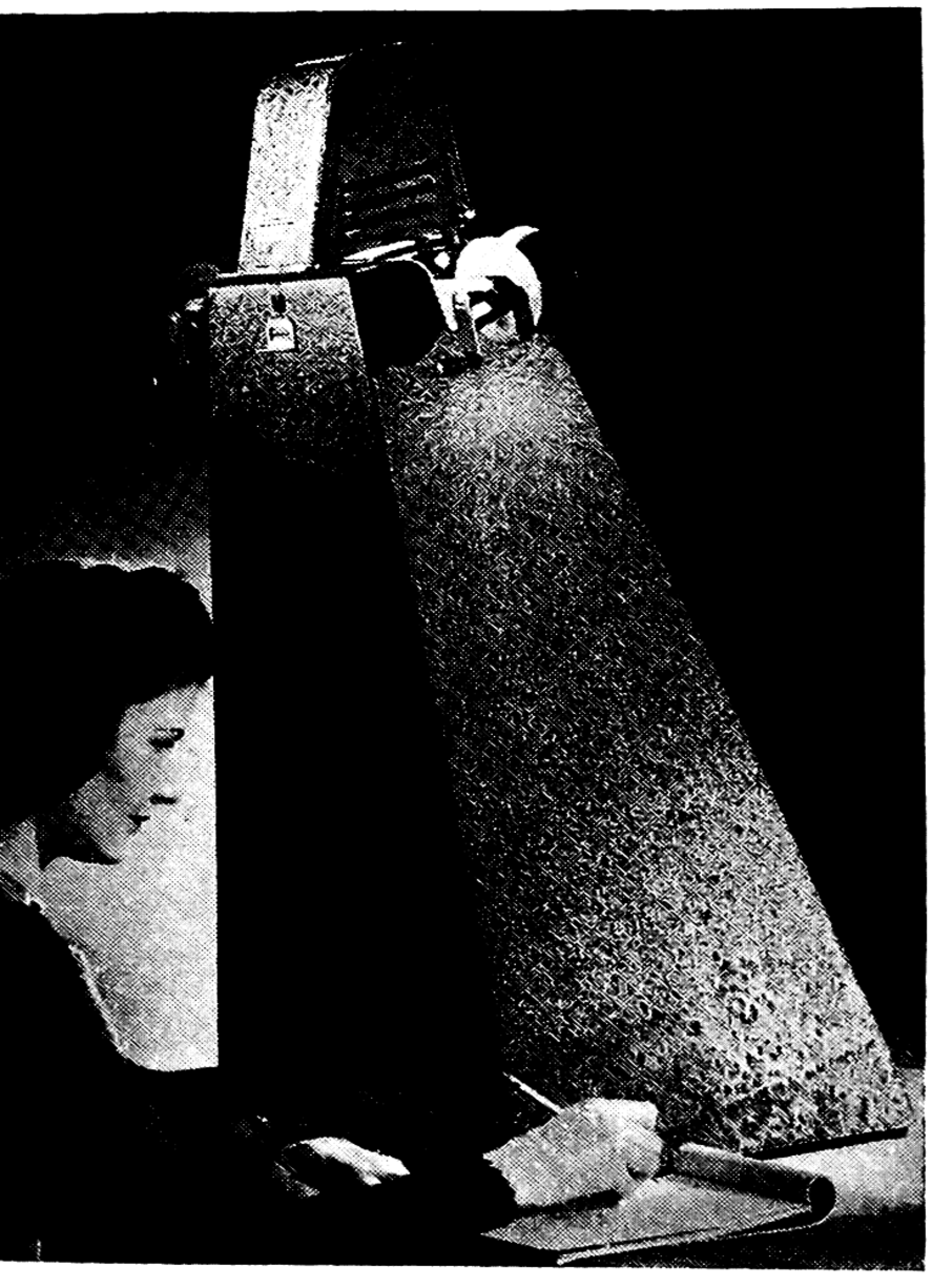
one who has not kept pace with this development. It is estimated that between half a million and a million pages of material are copied each year. By this device libraries are enabled to obtain back issues of journals. Projects are being formulated to microfilm all the books printed in England before 1600, making their availability world-wide. A similar plan is to film all the American periodicals published prior to 1800.

The United States Library of Congress is active in the microfilming movement. University and public libraries are adding microfilms to their services.

A daily newspaper must keep files of all back issues. Storage space soon becomes a problem, and there is always the difficulty of consulting back issues for information. Many newspapers run a column headed "Ten Years Ago," or twenty-five or a hundred. The simplest method yet found of culling the back issues for the necessary information is to make use of the microfilm. A year's files of a daily newspaper produce a roll of film comparable in size to an ordinary kitchen measuring cup. The space occupied by microfilm is about 1/60 to 1/125 of the original. Newspaper files

A typical library microfilm reader. This Spencer model is adapted either to 16-mm. or 35-mm. film.

COURTESY OF AMERICAN OPTICAL COMPANY



This is a microfilm reader for the spool of film shown on page 186. Note the position of the screen.

COURTESY OF DIEBOLD, INC., CANTON, O.



are not only bulky, but the estimated life of such files is about thirty years. Microfilm has a life expectancy comparable to rag paper, which is about five hundred years. Danger from loss by fire, mutilation, and theft can be offset.

Some banks microfilm every check which passes through the organization. Deeds, county and governmental records, abstracts, census data, court proceedings, hospital records, and many other valuable papers and records are now systematically being recorded on microfilm. Often the film negative is retained by a photographic company and the organization having the work done uses positive prints. Thus, the master negative is stored in another location and copies may be had at any time.

V-mail involved the same process. It was often done hurriedly and the work was not always of good quality, but a desirable saving in space resulted.

Interestingly enough, the microfilm idea was born out of the conditions of war. During the Franco-Prussian War of 1870, Paris was besieged. A photographer by the name of Dagron invented a process of photographing messages on collodion or wet-plate emulsion. This collodion film was then stripped from its glass support and was ready to be sent. Dagron left besieged Paris and made his way to Bordeaux. Pigeons were sent out of Paris by balloon. Film messages were carefully inserted in a quill and fastened to the tail of the pigeons who flew the messages into Paris. Upon receipt the film messages were projected and the contents copied on paper. This was the means by which Paris was kept informed of outside developments. The versatile Départment de Postes et Télégraphes not only handled official messages but also handled mail by this unique device. It was expensive—five shillings per word. Some pigeons carried mail with a revenue value of fifty thousand dollars. After the war the process was discarded and forgotten. A privately printed booklet has described the whole venture—*La Poste par Pigeons Voyageurs, Dagron, Tours—Bordeaux, 1870–1871.*

OVERHEAD PROJECTION

Overhead projectors are of most use for instructors who desire a lecture lantern which can be operated from the front of the room. This enables the instructor to face his class; in fact, he may remain seated at his desk. The material to be projected is placed in the lantern and the image is projected onto a screen which is attached to the wall above the instructor's

desk. The screen should be tilted at the proper angle for clearest projection. With this device the instructor can point out objects in the image by pointing to the slide in the lantern with a pencil. The projector should be about eight feet from the screen. This will give an image thirty inches square with a six and one-half inch focal lens.

Attachment of the overhead projector to the standard slide projector is made by simply detaching the bellows and fastening the overhead attachment to the frame of the stereopticon just in front of the slide carrier. The light proceeds through the regular condenser to a reflecting mirror. It is then reflected upwards to the slide which rests on a slideway. After passing through the slide, the light is focused by the projection lens onto the screen, which, as stated above, is hung at an angle so that the image is square and undistorted.

Several companies are now producing variations of the overhead projector described above. Essentially, the machines are all alike. Examples are the Vu-Graph, the Visual Cast and the Scribe Visualizer. With at least two of these devices, it is possible not only to project prepared copy, but writings and illustrations can be used during the presentation. Although these projectors have been more widely used by commercial and industrial organizations than by schools, there is every reason to believe that high school and college teachers will find them helpful. The lecture-demonstration can be vitalized considerably.



Material is flashed on the screen through the use of the overhead slide projector with tachistoscope.

COURTESY OF STATE UNIVERSITY OF IOWA

One type of projector in this general category which schools are using is the tachistoscope. This machine provides a shutter attached to the lens of a projector so that the operator can time flashes on the screen. Principal uses for this device are seen in teaching spelling and number combinations, providing for drill and quick recall exercise, certain types of testing, and remedial work in reading.

Attachments for vertical projection were introduced by Dubosq in 1868. Although refinements have kept pace with general developments in projection, the device has limited use.

STEREOSCOPE

Strictly speaking the stereoscope with its stereograph does not belong in a chapter on "projected pictures." They are nevertheless included with projected pictures at this time, because a lens and a viewing mechanism are used. With the unaided eye the flat stereograph serves no purpose.

Definition. The word *stereoscope* is derived from two Greek words meaning *solid* and *to see.* The instrument is, therefore, a device for representing objects, in apparent relief and solidity, by uniting into one image two plane representations of these objects as seen by each eye separately.

Stereoscope pictures are called stereographs. In England they are called stereograms. Usually the reverse side of the stereograph carries printed data concerning the picture or diagram.

Models. The stereoscope has two or three more-or-less standard forms. The most popular classroom model is a small instrument, light of weight, which the pupil can easily hold before his eyes for some time without physical fatigue. It consists of a pair of lenses mounted about three inches apart in a frame. A partition between the lenses keeps the vision of the right eye separate from that of the left. In front of the lens frame is a metallic hood arranged to fit the face around the eyes and to shut out the light. Beyond this frame is a slide on which a frame or card carrier is placed. The picture to be viewed is placed in this card carrier which is pushed along the slide to permit proper focus. This model of the stereoscope may have a handle beneath it so that it can be held before the eyes with one hand, or it may be a box type without a handle, which is held before the eyes with both hands.

A pupil's reading readiness is being tested with the use of the telebinocular.

COURTESY OF ST. LOUIS PUBLIC SCHOOLS



A junior model, without the hood and with a collapsible focusing adjustment, is also obtainable. Although it is not as satisfactory as the standard model described above, it is a cheap and useful instrument.

The *telebinocular* is the de luxe model of the stereoscope. It is a well-designed and well-constructed piece of weighted apparatus which rests on a table while in use. It is equipped with an electric bulb to illuminate the picture which is to be viewed. It is a much more precise instrument with uniform illumination.

Stereoscopic pictures are made in two ways: they may be photographed with a stereoscopic camera, or hand-drawn. The stereoscopic camera has two sets of lenses operated simultaneously. The lenses are set at slightly different angles analogous to the angles of the human eyes. When stereoscopic pictures are viewed through a stereoscope the effect is three-dimensional—the picture appears to have solidity or depth, a binocular vision effect.

Picture Values of the Stereoscope. Everyone recognizes the value of the camera to the teacher and to classroom instruction. Yet, valuable as the photograph is, it does not truthfully show what the eyes actually see. In fact it shows only what one eye perceives. Accordingly, the camera loses much of value simply because it does not record a complete impression of what both eyes perceive. It is not binocular.

In the ordinary camera, which records volume in two dimensions, depth is experienced by interpretation through such factors as light and

shade, relative size of objects, perspective, and convergence of lines. Much of this interpretation is achieved through a comparison of known objects in a picture. Without some basis of comparison, a child might easily conclude that a rabbit is as large as an elephant if each is photographed separately and alone. Of course, experience prevents such an error, but there should be something in each picture which acts as a familiar unit of measurement. Space relationship is as important as shape to a picture which purports to be an instructional medium.

Methods of Using Stereographs. It has been repeatedly stated that each audio-visual device fills a special place in instruction. By and large these materials cannot be substituted one for another. Flat pictures, motion pictures, and stereographs illustrate this principle. Clearest concepts of the actions of geysers, for example, can be achieved from motion pictures. The majesty of the Grand Canyon and the awesomeness of Crater Lake can be shown best with stereographs. But for pictures involving width and length chiefly, such as rivers or coastlines, the flat picture is quite satisfactory.

The stereograph has been much misunderstood and misused. Many teachers who have attempted to use it have made no study of its value or the technique of using it; consequently they were so disappointed with the results achieved that not a few school districts over the country have in their stockrooms stereographs and stereoscopes covered with the accumulated dust of years. Stereographs must be integrated with the course of study and units of instruction. There is little value in viewing a few haphazardly selected stereographs.

In addition to instructing the pupils in the general care and mechanics of the stereoscope, the teacher will need to call their attention to the printed data on the reverse side of the stereograph, and see that the seating arrangement allows for maximum illumination. He should also explain proper focusing and the meaning of three-dimensional pictures.

Uses and Values of Stereographs. The uses of the stereoscope and stereograph seem to fall into three classifications: industry, science, and education.

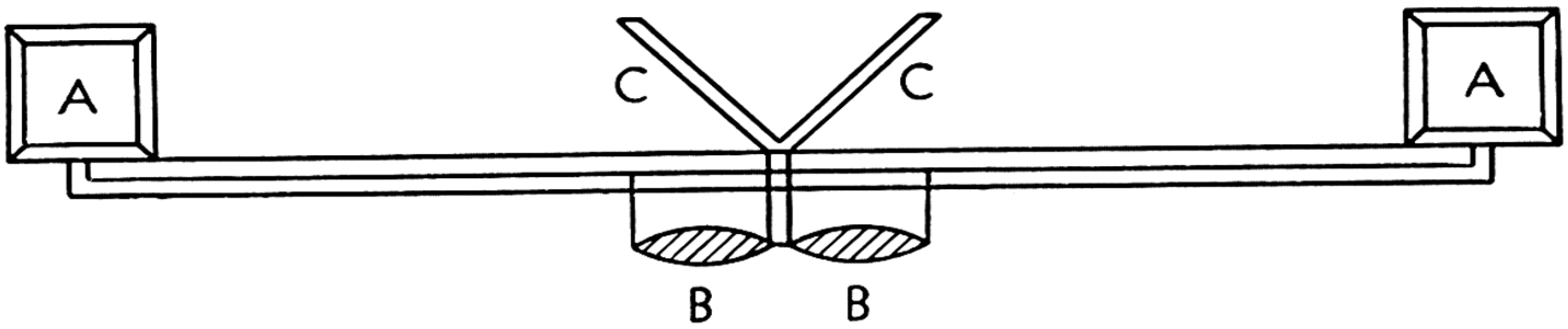
Industry. Several European firms have tried stereoscopic photography for magazine and catalog illustrations. *The Illustrated London News* and the Parisian *L'Illustration* have used it for special feature editions.

Each copy of the magazine contained a viewing mask of stained celluloid film clipped inside the magazine cover.

Manufacturers may find it a superior method of picturing their products in catalogs, or of showing their wares in advertising. Automobiles, radios, machines and objects of practically all types might present a much greater appeal through such an advertising medium. It would be the nearest approach to seeing the actual object.

Brief experimental excursions into stereographic motion pictures have been made. Patrons are provided with flimsy celluloid masks or lenses with which to view the picture. At this time, these pictures are hardly more than an interesting novelty. All told, use in industry and commerce is no more than experimental.

Science. Stereoscopy is used in microscopic work, in astronomy, in X ray, in aerial and land survey, and in optical study. Its value to the



Stereoscopic X-ray Apparatus

radiographer and surgeon is significant. Stereoscopic X rays not only locate fractures or foreign bodies in the human system, but locate them accurately and show more of their detail than ordinary X rays. A special apparatus is needed for viewing these X rays. It is an illuminated reflectoscope placed on a table, which can best be described by use of a rough diagram such as that above. AA are the illuminated stereoscopic transparencies, BB are the lenses, and CC the mirrors. For focusing, the plates, AA, are moved in or out from BB on the slide track.

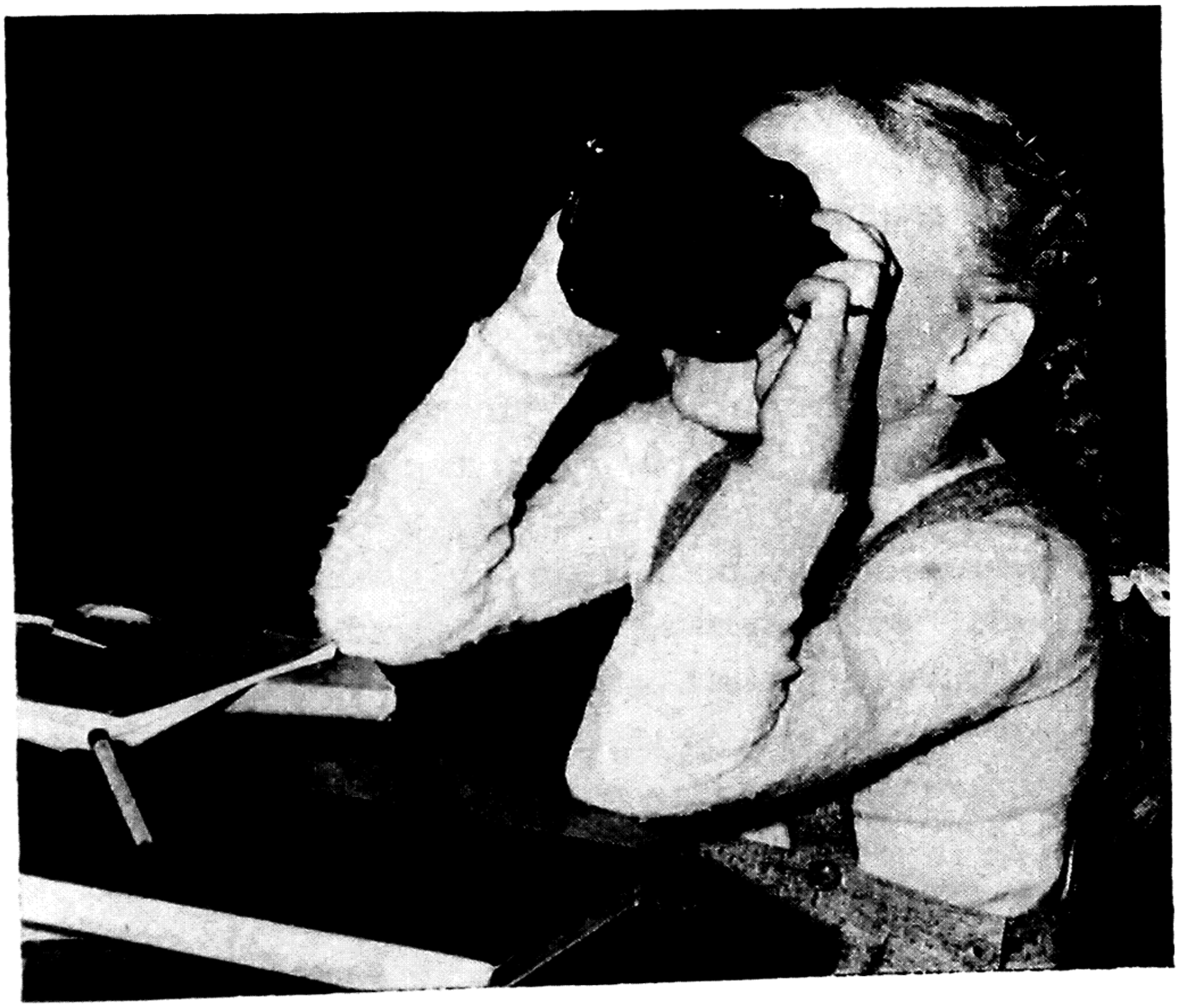
Education. Heretofore it has been thought that the stereograph should be used chiefly with intermediate-grade children. From the present discussion it should be obvious that it is a valuable aid all the way from the primary to the college and professional school. Primary children will obtain clearer concepts of animal and botanical life; intermediate and upper-grade children will find it useful in art, geography, science, and history; the student in junior or senior high school can profit from it in mathematics (particularly solid and descriptive geometry), physics,

chemistry, zoology, art, mechanical drawing, shop work, and other subjects; and advanced students will find it beneficial in visualizing complex diagrams, curves, and objects. The geometry student will welcome such an aid in his study of three-dimensional objects; the chemistry student for understanding of atomic structure, crystallography, and the like; the engineering student in mechanical drawing and visualization of all kinds of machines, instruments, engines, and constructions; and the medical student in dissections, and locations of bones and organs.

In recent years some experimentation has been undertaken on the telebinocular as an instrument for the detecting of reading difficulties of children. It has been found that many children with reading retardation are suffering from vision defects. Sometimes the vision defects are so serious that medical attention is required; at other times the school or reading clinic has been able to recommend exercises for the eye muscles and other helpful nonmedical remedies. The telebinocular has also been found helpful in testing young children for reading readiness.

Effective Use in the Classroom. Since stereographs are individual study aids, it follows that groups cannot work on them during the recitation. No teacher should attempt to pass the stereoscope among the pupils while trying to conduct a lesson. Time is wasted and divided attention results.

The stereograph finds its proper place in individual study. A few stereo-



Pictures have three dimensions when seen in this simple individual stereoscopic viewer.

COURTESY OF PORTLAND, OREGON, PUBLIC SCHOOLS

scopes and a set of well-selected stereographs for correlation with the regular lessons should be on the reference shelf to be used during study as reference books are used. In some schools they are kept in the library along with other reference materials. A caution should be issued against trying to use too many stereographs, thereby allowing the performance to become a mere handling of pictures. A few stereographs for study bearing on problems of the unit activity is a better plan. It is also necessary to warn against the repetitious use of the same stereographs in grade after grade. There should be stereographs for the primary pupils and different ones for succeeding grades. These should be suited to the mental maturity of the pupils and should be correlated with the experiences being developed in the class.

The chief problem with the stereograph is not to determine its value as much as it is to formulate a plan for its effective use.

A part of a typical pupil guide sheet is given below:

GUIDE SHEET FOR USING STEREOGRAPHS IN THE LIBRARY

Directions: Read each question carefully. Select the correct stereograph and find the answer, either from the picture or from the written material on the back. Write the answer after the question.

I. Part One—Introduction
- A. Stereograph 284
  1. What does this picture tell you about the topography in the Central Mixed Farming region?
  2. Why would it be easier to use machinery here than in some farming districts in eastern United States?
- B. Stereograph 285
  1. Why would road building be easier here than in our state?
  2. What do you find in this picture which shows that stock is loaded and unloaded here?
- C. Stereograph 282
  1. What kind of work is shown here?
  2. What shows that there is more rainfall here than in the grazing and forage crop region?
- D. What new things have these pictures shown you about the Central Mixed Farming region?

II. Part Two—Study Lesson
- A. Stereograph 278
  1. How do these buildings show that this is a region of much rainfall?

2. How can you tell that this farmer stores much corn for winter?
3. What does this farmer use to get water?
4. Do you think this farmer is prosperous? Why?

B. Stereograph 279
1. What does this picture show you that farmer Brown does on his farm?
2. Why has this corn grown so tall?

C. Stereograph 282
1. Why is this good pasture land?
2. Where was this picture taken?
3. Where does this farmer get the cattle?

III. Part Three—Summary Lesson or Test Exercise
1. The kind of work shown in stereograph 279 is ________ ________.
2. The kind of work shown in stereograph 278 is ________ ________.
3. The kind of work shown in stereograph 282 is ________ ________.
4. Stereograph 280 shows an important animal in this region ________.
5. Stereograph 278 shows the most important work in this region ____.
6. We are tall and beautiful. We like it better here than in the "cow country" because there is more rain here. We help to protect the crops from strong winds. We are the ________ in stereograph ________.

These children are studying at a library table with the aid of stereoscopes. Note the study guide to which the pupil at the left is referring.

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QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. What is an optical illusion? Is the stereograph an illusion?
2. Discuss the values and limitations, operation, construction, care, types, makes, cost and sources of opaque projectors. What is a Balopticon? A Delineascope? A Kodascope? How much area of surface will the ordinary opaque projector project? What is a "daylight projector"?
3. On the basis of the manner in which they are constructed, what are the various types of handmade slides?
4. What is "cover glass"? "Frosted glass"? A "thumb mark"? "A mat"?
5. What is lumarith? Advantages or limitations of it?
6. What is the difference in the principles on which the opaque projector and the lantern slide operate?
7. What are the most likely future developments of the aids discussed in this chapter?
8. Identify: (a) condenser lens, (b) focus, (c) focal length, (d) reflector, (e) objective lens, (f) throw, (g) mirror.

LABORATORY EXERCISES

1. Make at least one slide representing the various types of pupil-teacher-made slides. See Appendix A.
2. Prepare a set of slides on some unit of study, and present a lesson built around the slides to the class. Some suggested units:

   a. Flags of Nations
   b. Wildflowers of Your Country
   c. Games—"Now We Dance Luby Loo"
   d. Homes of Many Lands
   e. Butterflies
   f. Trees
   g. Healthful Foods
   h. State History
   i. "Icpuck, the Igloo Dweller"
   j. "Snow White and the Seven Dwarfs"
   k. "The Three Bears"
   l. Westward Expansion of the U. S.

3. Make up a list of materials, prices, and sources for a complete slide making outfit for use in a typical classroom.
4. List by trade name at least three lanterns suitable for classroom use. Give name of manufacturer, address, costs of suitable models.
5. Prepare a lesson which involves the use of two or more of the materials discussed in this chapter.
6. Obtain several of the filmstrips prepared by the American Council on Education on the geography of the United States. Study the teacher's guide. Show how this material might fit into a well-planned vital lesson.
7. There are at least three filmstrips and one sound motion picture on "How to Use the Film." Obtain one or more of these films and study them. Prepare an outline on how to use the filmstrip. The filmstrip may be rented from your nearest library, or purchased from the producer. Most producers do not rent.

Introducing Filmstrips—28 frames, black and white, National Film Board of Canada, 620 Fifth Avenue, New York, N. Y.

Teaching with Slide Films—40 frames, black and white, U. S. Department of Agriculture, Washington, D. C.

The Slidefilm in Teaching—38 frames, black and white, Young America Films, Inc., 18 East 41st Street, New York, N. Y.

Using Visual Aids in Training—sound motion picture, 16-mm., 15 minutes, black and white, Castle Films, 445 Park Ave., New York, N. Y.

8. Screen the film, *How to Make Handmade Lantern Slides*. Produced by Indiana University. Running time, 22 minutes. 16-mm. Color. May be rented from film libraries. Sale price $135.00. This film shows how to make eight types of slides. Teachers of kindergarten, elementary grades, and high school demonstrate how to make the type of slides most appropriate for their groups. Film gives many sources of content materials and uses for the various types of slides.

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Chapter 9

AUDIO–VISUAL MATERIALS: MOTION PICTURES

I, THE FILM

Edison gazed through the glowing lamp and dreamed
That magical figures dwelt upon the wall.
Everyman moves from the womb to the stars.
    Man hears, he sees, he hollows the cave, he builds the fire.
    Ages pass.
And Edison turns the celluloid page.

I, conceived by the sage as an educational tool,
Have become a communications universal,
Bringing to you ideas, concepts of world proportion,
Or details of such minuteness that except for my keener vision
You might never experience.
Who but me can bring you the beat of the hummingbird's wings,
Or the slow unfolding of a flower?
I, the film, now tell immortal stories of all time
In the *universal language*. Eye and ear
Know the tragedy of Juliet and the death of Romeo,

Know the ebb and flow of time as Huck and Jim
Guide their raft upon the river, by the tow-heads and the bluffs
In their journey to a Cairo far beyond.

I conjure up the picture for the people of the West
Of the glitter and the glamour of New York,
Or by miracles transport them, as the frames are running fast,
To the Amazon, the Indies, to the docks at old Southwark.
With a friendly hand I beckon to enchanted realms and times
When the common ways of life are deadly drear
And you hear Prince Hamlet talking and you see his pantomimes
From your seat in the last row, rear.

—Selected

Here, in some two hundred words of poetic prose, chapters have been condensed. The motion picture is the communications medium, the instrument, which the schools are using in ever-increasing numbers. This *universal language* is capable of bringing so much to every classroom; concepts of world proportions or minute details. The film helps children to answer their questions, to understand themselves and their environment, to give meaningful knowledge, and to acquire skills, attitudes, and insights. In the past the motion picture has served chiefly as a medium for the presentation of facts; but, more and more, it is assisting teachers in helping children develop those less tangible, but nonetheless valuable, insights and understandings which will enable the children confidently to take their places in society. Once the motion picture was considered by teachers as a supplementary device; now it is more than supplementary, it is a fundamental material for education.

Although widely utilized as a learning material, the motion picture is far short of the desired goal of availability to every school child. There are approximately 127,000 school districts in the United States. These districts are of several types, and vary in size from the small district which employs one teacher to the large city or county system which employs thousands of teachers. The school districts maintain approximately 276,000 school plants. Of these about 247,000 are elementary schools. Not all of these buildings are equipped to use the motion picture. Equipment is unevenly divided; there is a noticeable concentration in high schools and in urban districts. But at the current rate of development, in the foreseeable future every building will be so equipped.

As buildings are supplied with projectors, budgets for films, slides, filmstrips, and recordings will be stepped up so that teachers will have these

newer learning materials to add to their supply of older materials such as bulletin boards, specimens, and duplicating devices. It is reported that at the present time the total visual education budget of the average school is about one hundred dollars a year, a totally inadequate amount which must supply maps, slides, filmstrips, films, and recorded materials.)

HISTORICAL DEVELOPMENT OF THE MOTION PICTURE

(Although the development of the motion picture is new, the idea behind it is old. Ever since Roman times, scientists have observed that "images appear to move." Ptolemy in 130 A. D. spoke of the persistence of vision, the phenomenon which has made the motion picture possible.

The motion-picture projector appeared late in the nineteenth century. Many scientists contributed to its development, and there is some disagreement as to who the actual inventor was. John D. Isaacs and Edward Muybridge began experimentation in California under the sponsorship of Governor Leland Stanford.

Thomas A. Edison became interested in the experiments of Muybridge, and both men exhibited motion picture devices at the Chicago World's Fair in 1893. Edison's interest was largely spurred by two factors: (1) he was naturally intrigued by the possibilities of a moving picture, and (2) he had invented a phonograph and desired to show pictures of the artists at the time the records were played. Edison was so enthusiastic about the possibilities of the moving picture that he prophesied that the day would come when it would displace teachers. Now, half a century later, it is agreed that such a prophecy will never come true.

Other inventors who share the credit for inventing and developing practical motion-picture projectors are C. Francis Jenkins, Thomas Armat, and George Eastman. The first two of these men made and exhibited motion pictures at the Cotton States Exposition in Atlanta in 1895. Eastman by invention and purchase developed a flexible film as a medium for photographic images to replace the bulky glass plates used previously.

Though the greatest developments took place in this country, motion picture research was not confined to the United States. Valuable work was done in England and France. In the latter the work of Lumiere paralleled that of Edison.

Although arguments still remain unsettled as to just who may be credited with the invention, the cinema industry once fixed its Golden

Jubilee as 1939, and in 1944 the United States Post Office issued a special stamp commemorating the fiftieth anniversary of the motion picture, thus placing the year of birth as 1894, and by implication, at least, allowing credit to go to Edison.

First Motion Pictures Educational. (Theatrical motion pictures have taken such a significant hold on public opinion that it is easy to overlook the fact that educational pictures were among the earliest motion pictures produced. In fact, Muybridge's early experiments were conducted at the University of Pennsylvania with university funds, designed as a contribution to science and education.

In the latter part of the nineteenth century, Dr. E. J. Marey of Paris, an outstanding pioneer in cinematography and a professor of medicine, filmed pictures of insects in flight, water animals in motion, and body functions of other animals. It was he who first took pictures of moving objects under the microscope—one of these was the movement of the blood in the capillary veins. An associate of Dr. Marey, M. J. Carvallo, in 1900 made X ray motion pictures of the bending of the knees, opening of the hand, and muscular extension and contraction. He also photographed the process of digestion in the stomach of a frog.

In the United States, the federal government was among the first to see the possibilities of the motion picture for instructional purposes. The United States Reclamation Service exhibited films of the reclamation of arid lands at the Jamestown Exposition in 1907. In 1911 the United States Department of Agriculture began its long history of motion picture production. This department has continuously produced pictures on plant and animal husbandry, forestry, dairying, food chemistry, home economics, and various other subjects, down to the present.)

Edison not only pioneered in making motion pictures practical, but also was one of the first to produce films expressly for classroom purposes. Edison had been thrown out of school as a boy on the grounds that he was too stupid to learn. He developed a missionary zeal for the motion picture as an educational instrument, and although his zeal led him to make some ill-founded claims for the new device, his work and vision were of far-reaching importance. Beginning in 1911, the Edison Company produced a series of historical and scientific films such as *The Minute Man*, *Ticonderoga*, *Crystals: Their Making, Habits, and Beauty*, *The Cabbage Butterfly*, *Cecropia Moth*, and *Magnetism and the Electro-Magnet*. |

Henry Ford, a close personal friend of Edison, started a series of educational productions in 1916 under the general title of "The Ford Educational Weekly." Ford lavished great sums of money on these educational weeklies which apparently were designed to show people what their government was doing, how public money was spent, and the constructive work of Big Business.

(Motion pictures were seriously introduced for school use in 1910 when the Board of Education of New York City got a collection of one thousand films under the headings of Geography, Physics, Literature, and Natural Science. Most of the early attempts to introduce motion pictures into the schools were abortive because of such factors as inadequate supply of suitable films, expensive and clumsy projectors, lack of knowledge of how to use the equipment, and general apathy.

After more than a half century of trials and vicissitudes, the motion picture has arrived at its present status. All things considered, the fundamental development of the motion picture for classroom use, even auditorium use, occurred in the last decade. Its growth during this period was consistent, and is owing to such factors as: (1) development of less costly apparatus, (2) apparatus which is portable and adapted to classroom use, (3) availability of films of an instructional type teaching nearly every area of man's knowledge, (4) better distribution of films, both through commercial agencies and the establishment of film libraries by school districts, state departments of education, and extension divisions of universities, (5) entrance into the field of production by institutions of higher learning, (6) research by educators in universities into the values of motion pictures in schools, (7) pre-service and in-service training of teachers in the value and use of visual aids, (8) acknowledgment that the child's growth is an adjustment to multitudinous influences, both in school and out of school, organized and unorganized, which play upon him; and a willingness to jettison the outmoded idea that growth and welfare are limited to traditional subject-matter activities found in the organized school which closes at four o'clock in the afternoon and ceases its annual activities at the commencement in May, and (9) sales pressure from equipment manufacturers and film producers.

What the Motion Picture Is. (Motion pictures are not moving pictures at all. These pictures are a succession of still pictures. Still pictures are photographed on a film, each picture being called a frame. Motion

picture film is slotted on one or both sides and a series of sprockets in the projector engage these slots and pull the film through the projector, not in steady movement but in a stop-and-start action. The mechanism of the projector brings a frame of the film to a point between the lens and the light and the image is thrown on the screen for a fraction of a second—a still picture. The film moves on and another frame comes behind the lens—another stationary picture. While the film is moving from frame to frame there is no image on the screen, yet these still pictures are brought into focus so rapidly that there appears to be a moving image on the screen at all times.)

The illusion of movement is explained by the "law of persistence of vision." The persistence of vision was noted by scientists in ancient times, and the Roman Lucretius noted it in his writings in 65 B. C. The Greek philosopher, Ptolemy, elaborated on it in his writings on optics in 130 A. D.

In 1824, Peter Mark Rôget, a scientist as well as author of the well-known *Thesaurus* which bears his name, read a paper before the Royal Society in London entitled "Persistence of Vision with Regard to Moving Objects." His theory was that if pictures of objects or persons were passed before the eyes rapidly in separate consecutive stages, the images on the retina of the eyes would overlap or blend. An illusion of motion resulted from the blending.

Psychologists tell us that an image persists on the retina for one twelfth of a second after the real object has been removed. Therefore, if another object is shown within this period while the image of the preceding object lingers on the retina, the eye perceives no gap between the objects or pictures. Stated in another way, before the excitation on the retina produced by the first picture-exposure has completely subsided, a new excitation is set up by a new picture-exposure, and the result is a continuity of visual process.

The span between excitations may be lengthened considerably before any marked breaks occur because habit has taught us to "fill in" the "sights" which were really not there at all. Working, therefore, within the range of the "law of persistence of vision," motion photography has been pretty well standardized at sixteen frames per second for silent pictures; and for sound pictures, the rate has been stepped up to twenty-four pictures per second, largely to accommodate sound recording.

THE CONTRIBUTION OF MOTION PICTURES TO EDUCATION

The film is a medium with a technique of its own. Its powers and possibilities are much too great to be tied down to a single function. The motion picture can enable educators to teach more effectively and more cheaply such matters as health, safety, tolerance, current events, international relations, political philosophies, social and economic issues, and ethics. The motion picture can help develop social behavior and attitudes in keeping with educational purposes; it can help develop co-operation, teamwork, and the spirit of living together; it can help develop traits of character and the control of emotions; it can help develop independent thinking; it can help reconstruct the past and record present experiences as few other media of communications can.

The motion picture can help develop social sensitivity and moral consciousness. It can teach us how our brothers live, how governmental theories work, how human behavior patterns are formulated and developed, and how natural phenomena unfold. It can give social perspective and correlate isolated knowledges and facts into conceptual patterns, as well as teach skills and motivations.

The objectives of modern education are difficult to reach with materials



This University of Chicago classroom laboratory is equipped for synchronized sound and photographic recording of classroom sessions.

WIDE WORLD

and techniques short of the motion picture. Citizenship, esthetic appreciation, health, character, worthy home membership, vocational orientation, tolerance, worldmindedness, and the like are exceedingly difficult to teach through reading materials alone. More direct and more meaningful routes must be found.

Film materials are among the most flexible and versatile of all teaching materials. They tell their own story, although the sound film also makes use of a narrator who, as a master teacher, points out and emphasizes significant elements in the film lesson, much as a teacher does in making assignments, developing a new topic, or giving a demonstration. No other single teaching tool can lay claim to so many potentialities and bring so much enhancement to teacher and class. The motion picture sweeps away many of the barriers or limitations to learning, namely, those limitations found in (1) distance, (2) unreality, (3) seasonal handicaps, (4) limitations involving sight, sound, color, and motion, (5) difficulties of interrelationships of ideas, (6) poor motivation, (7) abstraction, and (8) the limitations of "eye-seeing." The sound motion picture has a unique facility in overcoming these limitations. Distance is annihilated. The happenings from the four corners of the earth can currently, cogently, and realistically be brought to the classroom, not through the cumbersome and often verbalistic written commentary, but through synchronized sight and spoken word. Abstract concepts are clarified because of their reality and directness. Seasons no longer limit the time at which certain concepts must be taken up by the teacher. Ideas are integrated into patterns or "wholes" for the pupils. Color and motion add to reality and concreteness. The camera and the projector using film extend learning beyond what can be seen by the naked eye. They provide the classroom inexpensively with the benefits of such costly equipment as the microscope and telescope. Things which are too small to be seen by the unaided eye are made available through microphotography; time-lapse photography speeds up slow action until it can actually be seen; slow-motion photography slows down fast processes; and animations explain processes which are abstract and theoretical.

Experimental studies of film use have shown that the rate of learning is expedited when measured both by amount learned in a given period of time and amount retained after lapse of a given period of time. These studies also show that this increase in the rate of learning is somewhere between 10 per cent and 40 per cent, and that this is true for all levels

of learning from the primary department to the university. Similar, if not greater, results were found during the war by the army and navy and by industry.

Not only do motion pictures expedite the rate of learning, but they increase the scope. This is an important consideration in a world where the mass of learning about things, people, processes, and ideas is expanding so rapidly that it is impossible to know everything which a person might wish to know. There was a time when the known body of knowledge might be completely encompassed by one brain; then one person might have written an entire encyclopedia, and the author could have inscribed in the foreword a note to the effect that he had set down within the covers of the book all the knowledge known to man. Consider one example of time saving insofar as just one topic is concerned. The topic is the study of the Panama Canal. Among other things, the teacher will wish to have the pupils understand its exact location, why it was built at this particular location, why the United States built it, the difficulties encountered in the building, how we got permission to build it, its advantages to the United States, how it can be defended in time of war, something of the manner in which it functions, the people who operate it, its place in international affairs, probably a comparison with the Suez Canal, and so on. Volumes have been written around the objectives just listed, yet the teacher and pupils must complete their study of the Panama Canal in a very short time. Investigation and detailed study are not necessary. A certain informative and appreciative conceptual understanding is sufficient. Definitive study will be reserved for the engineer, sociologist, bacteriologist, military strategist, economist, and international statesman. The motion picture will enable the teacher to present clearer and richer concepts in less time than with any other technique. A good film of twenty minutes, presented twice along with the usual amount of study and class discussion will accomplish the objectives sought. In addition there will be pupil motivation and secondary learning.

The motion picture is the best means so far devised of showing the continuity of happenings, processes, or causes and effects. In the space of a quarter of an hour, students may follow the extraction of sulphur from the earth, through refinement, and into its many uses in daily life. In like manner the drama of the territorial expansion of the United States from a handful of disunited English colonies to the present development

may be seen in half an hour. Digestion can be followed from the intake of food to ultimate assimilation. The development of tuberculosis in an individual from the initial infection to the stage causing death can be seen and studied in one continuous uninterrupted unit.

Carefully controlled experimental studies show that the permanence of learning is increased when films are used. This is probably no surprise to anyone. It is a fact that can easily be observed either with children or adults.

Classroom Utilization. There is no one technique to be applied in the use of films in the classroom. To some, this may seem to be unfortunate, because some people want *a plan.* To others this absence of exact procedure is viewed as an advantage. This permits each teacher to plan the use of films in terms of the needs of the pupils and in connection with the unit being studied. Teachers who understand the value and use of films in classroom instruction hold that there are many ways of using films, any one of which may be the best under certain conditions. Scientific investigation has been conducted on the problem of techniques of using films and some valuable suggestions can be made.

Again, the admonition must be made that teachers keep in mind the purposes for which films are to be shown. These purposes are manifold. Motion pictures, like all audio-visual materials, must be correlated with other curriculum materials. If it can be assumed that the motion picture is



The motion picture is an unsurpassed visual aid for bringing the world to the classroom.

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the best instructional tool to be used in a certain situation, the following steps will lead to more meaningful and efficient utilization.

1. Plan to use a classroom instead of an auditorium. It is imperative that proper learning attitudes be present. These are best promoted by study in the regular classroom or laboratory, not the auditorium.

2. Use the motion picture at the psychological or logical time which fits the purpose for which the film is being used. It can readily be seen that one cannot give a specific time for showing the film because it may be used to introduce a unit of work providing background and interest for further unit study; its purpose may be general enrichment by adding information, assisting with a skill, or development; or its purpose may be one of review following study of the unit.

3. Teacher preparation for the use of the film is essential. This means preview and study of the film content, and a knowledge of the study guide which usually accompanies a good classroom film. Teachers need real conviction on this point, and this is just as necessary as it is for teachers to know that apparatus planned for a demonstration will function, or to know the content of references before library and supplementary assignments are made. Certain studies which have been made of film utilization show that film previewing is not too popular with teachers. They advance such reasons as too busy, no free periods, projector not available, and screening room in use. These are administrative problems which must be resolved if efficient utilization is to be expected. Numerous solutions will occur to anyone genuinely interested in doing a good job of teaching. With the preview the teacher would plan explicitly how the film is to be correlated with other learning activities such as the laboratory, library, class discussion, composition, or creative work.

4. Prepare the class for the film. Ordinarily it is bad pedagogy to spring the film on the class without preparation. Pupils should know why the film is being used, what to look for, and how it should be checked against the text and the learning which has already taken place.

5. Show the film. Do it as a part of the normal process of instruction without the trappings and spirit of a holiday, or a bonus for good behavior or attention to assignments. Films must be taught, not just displayed. This may mean multiple showings. The teacher should be guided by the questions from the class, the objectives sought, the difficulty of the concepts, and other pertinent considerations. If a film is a short one, it may be re-run within a single class period, or it may again be projected the follow-

ing day, or the next week, depending upon the factors already suggested.

6. Follow up. Do something about the film, do not just display it. Neither is it sufficient for the teacher to ask, "How did you like it?" Write, discuss, verify, test, build, experiment, or do any of several of the many things which cause learning to "lead out." Study guides prepared by teachers on the films they plan to use have been a fruitful technique. After the showing of the film, the class discusses the prepared study guide. John A. McHugh, teacher of chemistry in the Johnstown High School, used the following study guide in connection with the film, *Manufacture of Pig Iron and Steel.* The study guide was given to the pupils and discussed briefly the day before the film was shown. This outline is not necessarily comprehensive, neither was it intended for publication, but it serves nicely as an illustration.

The Blast Furnace

1. What is the purpose of the charging bell?
2. Notice what the charge of the furnace includes.
3. What is the purpose of the blast of air?
4. What uses are made of furnace gas?
5. Notice the range of temperature in the furnace.
6. Why is coke used?
7. Where is the hottest part of the furnace?
8. What is the color of the slag from the furnace?
9. What are some of the uses of the product of the furnace?

Bessemer Converter

10. What is the furnace charge?
11. What is the method of removing impurities?

Open-Hearth Furnace

12. What fuel is used?
13. How is the furnace charged?

Electric Furnace

14. The charge of the furnace may consist partly of what products of the blast furnace?
15. In what condition is the product of this furnace?
16. What are ingots?
17. For what purpose are ingots used?

Later Mr. McHugh used the following list of mimeographed questions:

Blast Furnace

1. The charging bell keeps (*gases*) from escaping.
2. The charge for this furnace consists of: a. (*coke*), b. (*air*), c. (*limestone*).
3–4. Gas is used from the furnace: a. (*to make electricity or to make power*), b. (*heat incoming air*).
5. The hottest part of the furnace is at the (*bottom*).
6. A blast of air is forced through the stones by (*engines or blowers*).
7. Coke (*combines with or reduces*) the iron ore.
8. Slag is (*white*) in color as it comes from the furnace.

Bessemer Converter

9. This furnace is charged with (*molten iron*).
10. Impurities are removed by a blast of (*air*).

Open-Hearth Furnace

11–12. Fuel used is preheated by: a. (*gas*), and b. (*air*).
13–14. The product is removed from the open hearth by (*tilting*) the furnace.

Electric Furnace

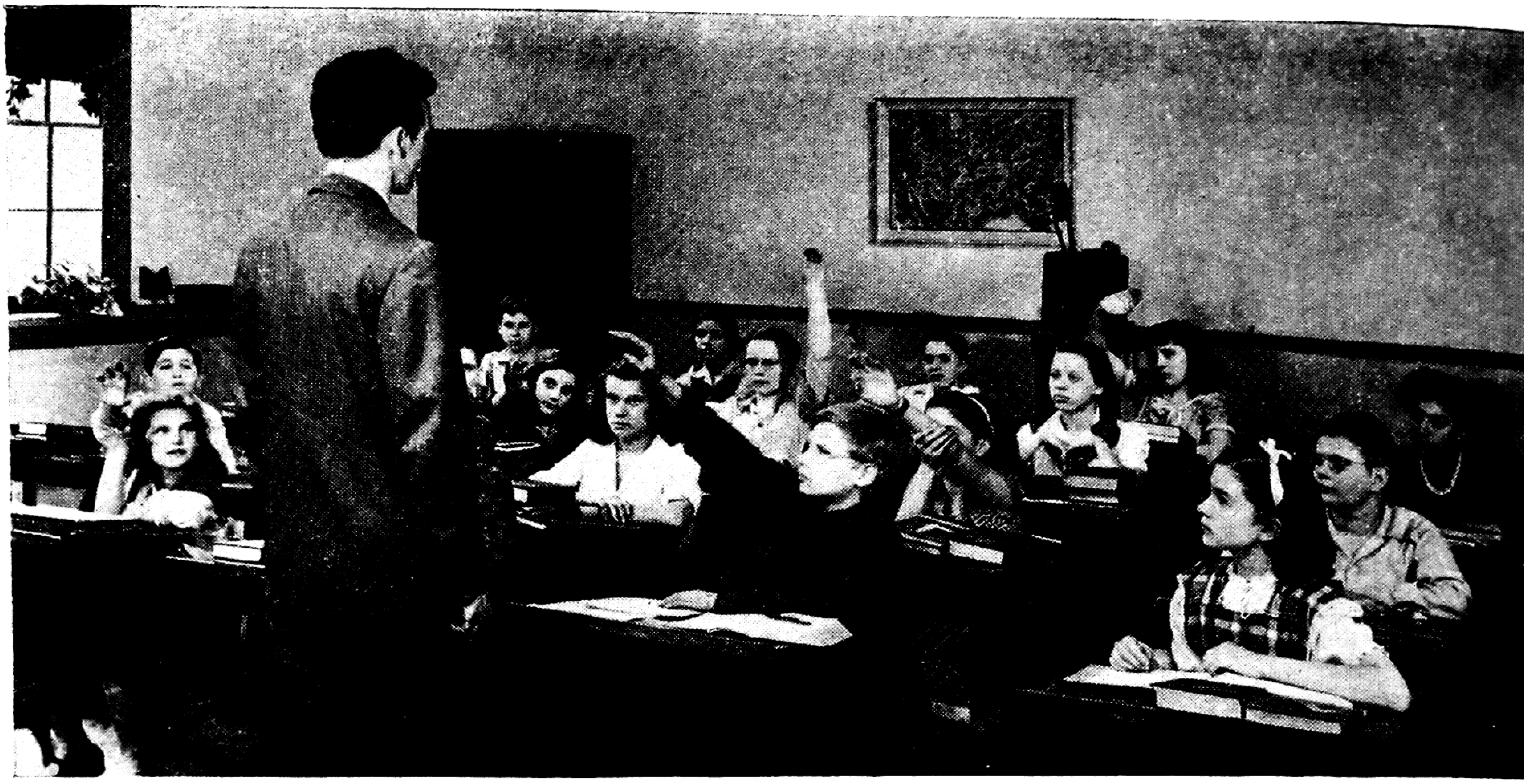
15–16. Molten metal from the electric furnace, open-hearth, and Bessemer is poured into molds called (*ingots*).
17. These molds of steel are used for (*rolling*) the metal into the finished product.
18–20. To what three furnaces may the product of the blast furnace be taken and used as the charge?: a. (*Bessemer*), b. (*open-hearth*), c. (*electric*).

Films such as *Our Shining World, Distributing America's Goods, One World or None, A World of Plenty,* or *Round Trip: U. S. A.* offer ample opportunities for socialized discussion and study. In the lower grades, films of the type of *A Letter to Grandmother, The Adventures of Bunny Rabbit,* and *Tommy's Day* will foster a desire to discuss common juvenile experiences.

Children may also be stimulated to express themselves in writing.

It should be pointed out that years ago Professor Judd emphasized the fact that the amount of transfer of training is conditioned by the generalizations made by teacher and pupils. Excellent opportunities for generalizations present themselves in connection with the use of films.

Critics have raised the question, Do films stimulate thought or is the



COURTESY OF ENCYCLOPEDIA BRITANNICA FILMS, INC.

Here the showing of a film is being followed up by a class discussion.

matter of film study a passively receptive process? To what extent it is one or the other will depend much upon the type of films used, how they are used, and why they are used. A good film on Indians, folkways, protective coloring of animals, or clothing should be provocative of thought. In like manner it should provide almost unexcelled opportunities for teaching interrelationships and for integrating ideas. Nearly every film cuts across subject lines and presents a varied and comprehensive view of the topic. A film such as *Tschaikowsky's Overture 1812* contains excellent material about war, refugees, life behind the lines, clothing and styles, Russian church services, and power of spiritual belief. Here are history and social studies in a film devoted to a musical composition of a famous composer, and a rendition of the piece by an outstanding symphonic orchestra.

Every teacher who has taken a class on a trip or a school journey knows that some follow-up of the trip is essential if the greatest value of the trip is to be captured. The same principle applies to the classroom film.

7. Keep an evaluation record and inventory of every film used. This record, more functional than the write-up furnished by the film producer or distributor, might well take the form of an annotated bibliography and include careful notes on how the film correlated with the unit of study, student reactions, and other places in the curriculum in which the film would be useful. Records of this type are invaluable in considering film

materials in succeeding semesters. These records should be accessible to all the teachers in a certain building or school system. They will provide them with a type of information that cannot be had from catalogs and descriptive folders. If all the teachers in a given school system were to keep such records, and if these records were on file, for ready reference at all times, an invaluable library of evaluations and pooled teacher judgments could soon be built up. A record of this type, if freely consulted when orders are placed either for the rental or purchase of film materials, will also eliminate much waste of money and time. To this library there should also be added the *Educational Film Catalog* published in monthly installments by the H. W. Wilson Company of New York, since 1936. This catalog contains evaluations and descriptions furnished by teachers and educators from different parts of the country.

The form of the evaluation is not important, but the student may wish to consider the forms reproduced in Appendix C as examples. Forms of this type tend to be complicated and not altogether pertinent for the classroom teacher. These forms are especially valuable for the director of visual education or the film librarian in the large school system or in the film rental library. True appraisals and evaluations can best be made by the final consumers of the films—pupils and classroom teachers. They do not need elaborate checklists and appraisal forms.

The procedures described in the preceding pages will go a long way toward eliminating many of the abuses which are current in the use of instructional motion pictures. In Appendix B, the student will find outlines which point out specific uses of film materials as applied to study units. The material in Appendix B is varied. Some of the suggestions follow along conventional subject-matter patterns, whereas others are based on problems. These materials are suggestive only. As pupils meet and attempt to solve any problem which is of value to them, they may actually use not one film but many. The concept of tolerance, for example, may call for four or five films as well as filmstrips, slides, and recordings. A film lesson as such may be of no more value than a chapter from a textbook. It is a source material used in the solution of children's felt needs; it may help them understand the past, solve the problems of the present, or anticipate the challenges of the future.

It is well to repeat again at this time that the Study Guides which have been prepared by teachers for use with certain films should not be overlooked. A school with a good visual program will want to build up a



An important part of the preparation for the use of a motion picture is a study of the teacher's guide. The guide does not, however, preclude a previewing of the film.

PCW FILM SERVICE

library of Study Guides. They are inexpensive and are of great value. Even if a school district rents its films instead of owning them outright, it can maintain its own library of manuals. For example, a school may not be able to purchase a library of instructional films produced by the Encyclopedia Britannica Films, Incorporated, because they cost fifty dollars a reel, but the Guides for these films sell for five cents each.

Two objections that are frequently raised against the use of films are that they encourage a passive instead of an active attitude in those who are being taught, and that they usurp the functions of the teacher. In this latter respect, however, the film is precisely on a par with the textbook. If a film attempts to usurp the functions of the teacher, it is a bad film. A good film may relieve the teacher of certain burdens and difficulties, but it should provide abundant material for the teacher to use.

With regard to the charge that films encourage passivity, this again is only true of bad films. Films can stimulate wonder, excite interest, or provoke curiosity; such films will be educationally valuable. This function of films is prominent in biology, with its wealth of unfamiliar material.

The chief danger of the use of films in modern education is the danger of pedantry and dullness; but this is equally true of textbooks.

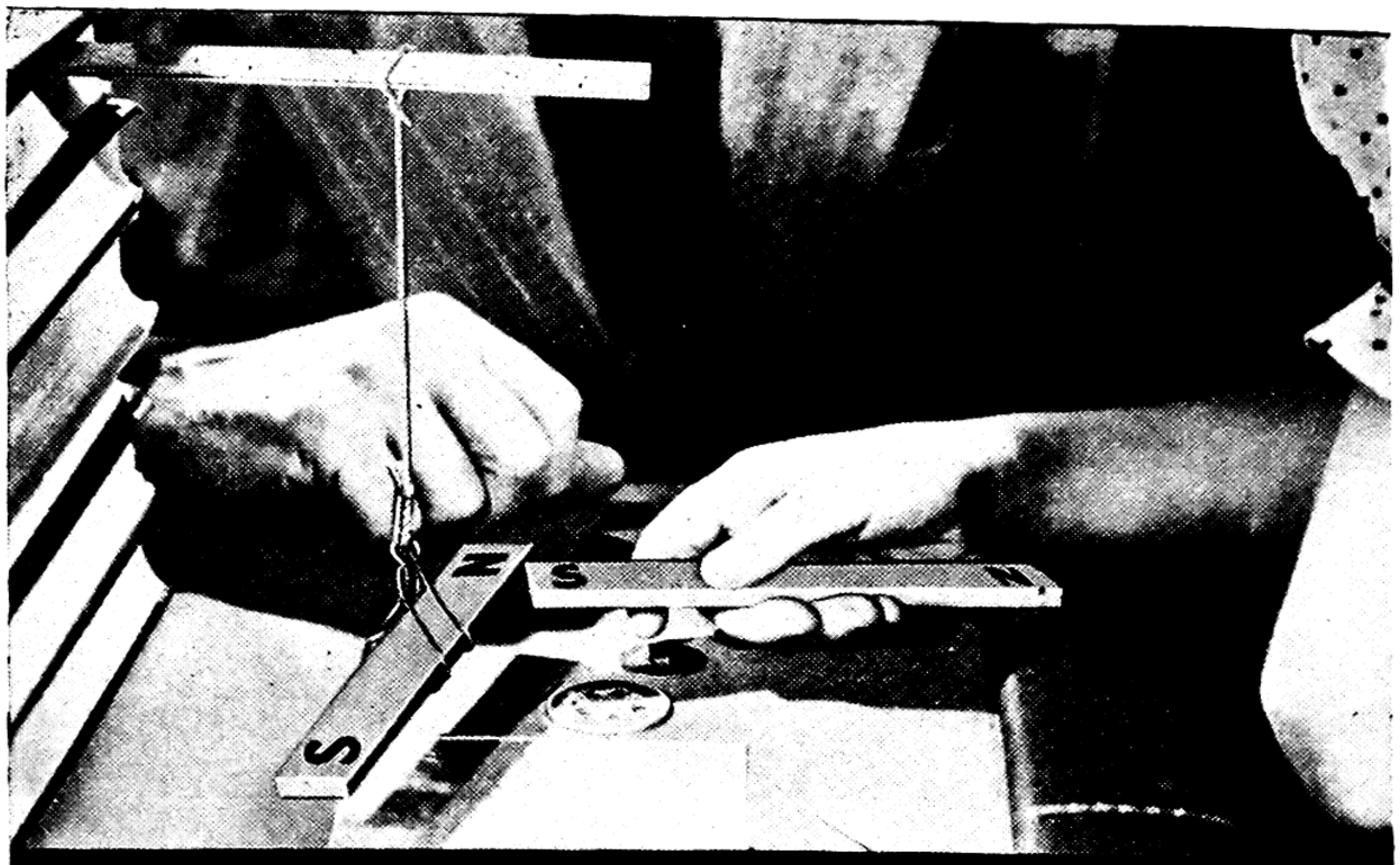
CLASSIFICATION OF FILMS

There are many ways of classifying films so that the various types may be described. They might simply be classified by major functions, such as instruction, recreation, and propaganda. Such a classification is of little

value to teachers because it is too general. Another classification is by the educational level or maturity of the pupils which the films are designed to serve, such as primary, intermediate, junior high, senior high, technical school, college, and general adult. This classification is unsatisfactory, too, because films have a wide range of usefulness. Still another system of classification would rest on the content of the films, thus they would be classified as films dealing with natural science, social science, occupations, distributive education, safety, and on through the content field. Such a classification is very helpful to teachers; however, it should be kept in mind that many films will serve several functions. For example, the film *The Adventures of Huckleberry Finn* is naturally associated with Mark Twain and American Literature. It is also quite valuable for the study of social conditions in the United States prior to the War Between the States, slavery, law and order (with vigilantism), human relations and ethics, and styles of dress. Cross-indexing becomes imperative in this type of film classification. This type of classification is extremely valuable to the film librarian because he can easily locate films by subjects, which is the manner in which teachers usually request their materials. The H. W. Wilson Catalog follows this arrangement and uses the Dewey Decimal Library System.

For the description of films at this time, interest centers around films by *type* or *technique* as well as content. Hence, the following categories: (1) informational, (2) skill or drill, (3) appreciation, (4) documentary, (5) recreational, (6) dramatic and episodic, (7) cartoon, (8) news, (9) scientific, (10) industrial, and (11) provocative. At once, the question is raised, Don't they overlap? Yes, but there are differences between these categories which are sufficiently noticeable so that the headings will be valuable in understanding the types of films now available. It must be granted at the outset that instructional films, for example, can be recreational at times, and recreational films can be informative. But this overlapping need not disturb the reader, because the chief concern is functionalism rather than exact systematics.

Informational Films. Informational films inform, instruct, or provide knowledge or facts about people, processes, natural events, geography, social conditions, past events, occupations and theories. These films may be expository, associative, or analytical. As such, they are true teaching films because they provide understanding, give instruction, and act as a



This scene is from an informational film.

COURTESY OF YOUNG AMERICA FILMS, INC.

teacher. Naturally such a category includes what is sometimes referred to as background material, but it is also material, data, and knowledge that is formative and emergent. An informational film on Cuba could include any or all significant material which would lead to greater knowledge and understanding of that country as to history, the people, geographical aspects, government, socio-economic-political conditions, and other factors. Other films depict processes and are thereby informational. Examples of such films are *Digestion of Foods, Hay Is What You Make It, Freezing Fruits and Vegetables, The Story of the Bees, The Development of the Chick, Hamlet, Furniture Making, The Halogens,* and scores of others. By far the greatest number of films used in classrooms are informational. *Snakes* is a study of poisonous and nonpoisonous reptiles; *Human Reproduction,* a mature presentation of a difficult topic; *England: Background of Literature,* a literary journey. By the titles alone, it is evident that these films are informative, although, obviously not all inform in the same manner nor with the same degree of effectiveness. Films can induce thinking, and can lead to concept building, general enrichment of ideas, enlargement of vocabulary, and ability to apply principles.

Skill or Drill Films. Not so many films are available as yet in this category, but they are beginning to appear, and in time many skills will be recorded. When skills are to be taught, skill films are most welcome. They show, from many angles, how certain things are done in order to attain greatest speed, form, cleverness, and understanding. They are demonstrational. There are many areas for skill films, including typewriting, shorthand, and sports. The latter illustrates the type well. For example,

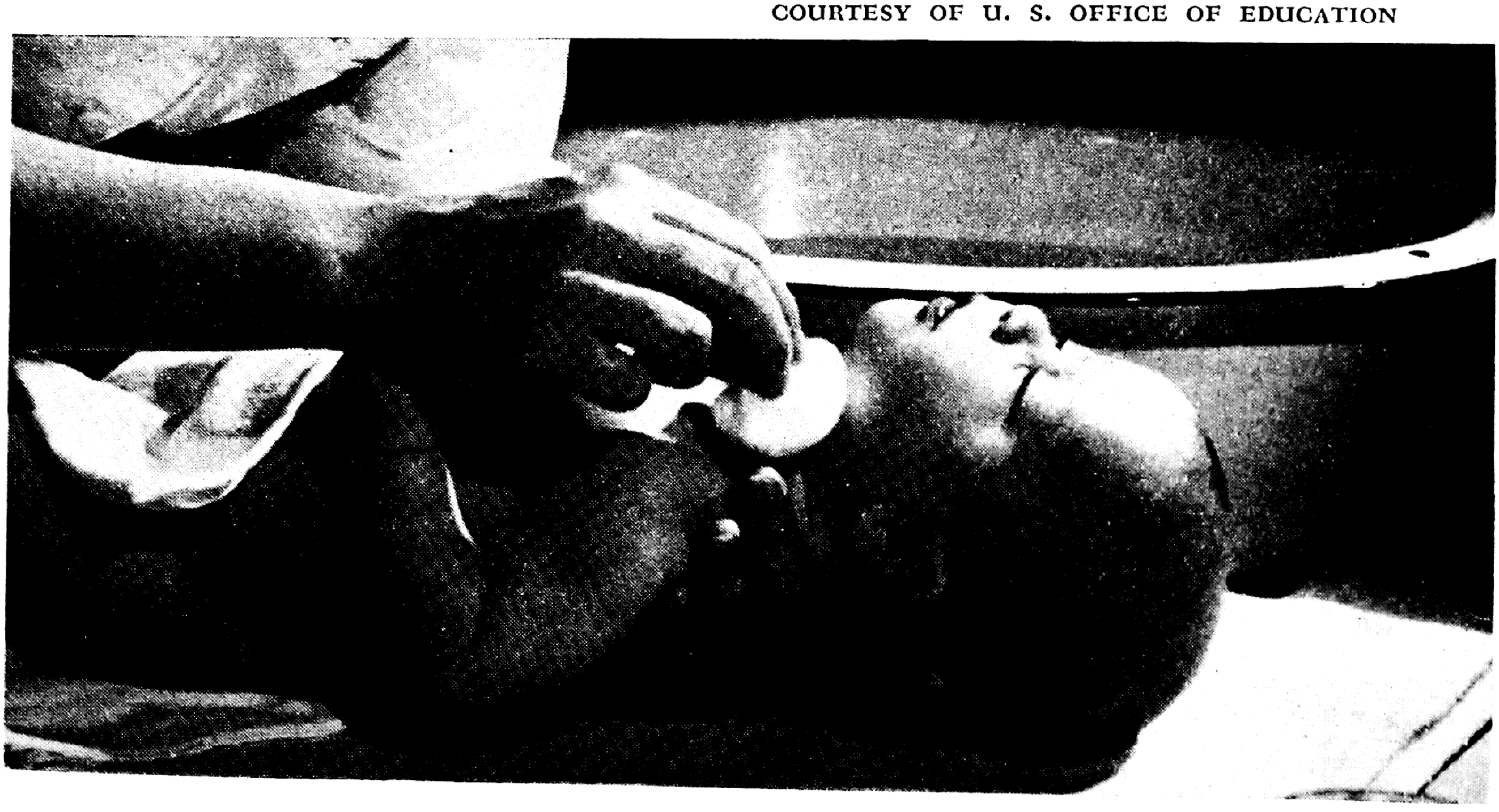
consider the following track and field series: *Sprints, Hurdles, Pole Vault, High Jump, Javelin, Shot Put, Discus, Relays, Distances, Middle Distances,* and *Broad Jump.* Each film shows the most commonly accepted techniques in the various events, such as the take-off, form, breathing, footwork, use of arms, or twist of body. Basketball and football films are also good examples of skill films. The film *Marionettes: Construction and Manipulation* is another example of the "how-to-do-it" film. It shows the whole process involved in making marionettes and staging a performance.

The "know-how" or "how-to-do-it" film served a most useful place during the World War II period. Foremen and workers were taught many of their skills and duties in a remarkably short time. Numerous films were produced on such topics as *How to Operate an Engine Lathe, How to Run a Drill Press, How to Repair a Mowing Machine.* Hospital and health films present many types of skills, among them being *How to Bathe a Patient, Care of the Newborn Infant, First Aid, Life Saving, Resuscitation.* The teaching of teachers is also a fertile field for this type of film; for example, the film *What Is Four?* deals with the teaching of the concept "four" to kindergarten and primary pupils.

Appreciation Films. As used in this discussion of films, appreciation refers to a sympathetic understanding, a way of thinking, feeling, or acting. It is an emotional overtone which is closely integrated with the

The care of the newborn baby is a difficult subject taught easily and clearly by the use of the motion picture.

COURTESY OF U. S. OFFICE OF EDUCATION



more analytical thought processes. It is the sort of thing that gives warmth to man's critical thinking. It is, therefore, a concomitant to thinking, and not just blind emotionalism. Modern educational evaluation stresses the significance of this sort of objective; it condemns blind emotionalism. Education strives to eliminate or overcome such blindness because it leads to an unreasoned emotional outburst typical of prejudice, mob reaction, and other undesirable behavior patterns. Patriotism, for example, may be an appreciation or a blind emotion. The advantages and disadvantages of the two types of patriotism are too obvious to need elaboration.

Films which develop wholesome, correct attitudes toward man, animals, things, or ideas are plentiful. But films that are designed to stir the emotions may be capable of evil, hence they need careful scrutiny and analysis. This analytical approach in itself is an interesting field of study. Films may be so made that they inflame the emotions of people, fan them into unreasoned reaction. It is the proper business of the school to guard against this. Propaganda is subtle and its detection is a worthy goal of education. Appreciation films cannot absolutely be separated from those which are informative, dramatic, or provocative, yet for educational purposes there is merit in setting up a classification that is chiefly concerned with films on the formation of attitudes. A few examples of this type of film are to the point. Teachers of primary children are concerned about forming proper attitudes among the children toward pets, the home, people in other lands, and man's work, among a host of other things and relationships. A film such as *Navajo Children* gives pupils a clear insight concerning Navajo children, their parents, homes, and pets. The film is informative, but it also provides an emotional overtone which has close association with understanding based on knowledge. Various other films provide the same kind of experience—they inform, build concepts, and provide appreciations.

Films in this category are closely allied with the whole field of the social studies. Tolerance of race and creed as well as economic and political tolerance are major educational objectives. Such films as *The Story of Doctor Carver, Americans All, Song of Friendship, Sons of Liberty, Make Way for Youth,* and *Bread and Wine* are excellent examples of films dealing with race understanding and attitude formation. *Productivity: Key to Plenty, Round Trip: U. S. A., The Story with Two Endings,* and *The Battle of Britain* deal with economic and political matters. One of the Hollywood producers has a series of films under the

Peoples of other lands can be appreciated only if they are understood. Next to a visit, a film is the most conducive aid to understanding.

COURTESY OF ENCYCLOPEDIA BRITANNICA FILMS, INC.



general title "Crime Doesn't Pay" to inform and build appreciation of the concept that crime is deleterious.

There has been much controversy over whether or not the effects of films which influence attitudes are enduring. Experiments have shown conclusively that students can be taught to recognize propaganda, selling, or persuasion in films, but little or no evidence is available to show the lasting effects of this teaching. In other words, will students adopt critical-mindedness in seeing and discussing films at school, and then check this critical faculty at the door when they go to see a motion picture at the local cinema? Will the critical-minded student become the blind, following adult?

Documentary Films. (The adjective "documentary" means the furnishing of proof through original or official papers whose historical authenticity is unquestioned. But when applied to films, the meaning of the word apparently goes back to its Latin origin, *docere,* meaning to teach. The documentary film, therefore, intends to carry a lesson, perhaps even a warning or admonition. In this connection it becomes propaganda in one sense of the word. The documentary film does not have a plot such as that found in most dramatic productions. It does not rely on rehearsed performances, actors, and staged settings. The actors of the documentary films are *real people in real life* situations. The documentary film is frequently referred to as the "idea film.")

Schools are trying to vitalize their curriculums to make them more nearly approximate real life, to load them with life-situation materials, to have them reflect what is happening today. The culture-heritage theory has proved to be inadequate for life in a democracy characterized by marked

social change. Children and youth should know how people live, how democracy works, how agencies of government function, how industry operates in the fullest sense, how the commodities of life are supplied, and how local and national protection are achieved. Such concepts and understandings are grist for the documentary film mill. Most people spend their lives within almost parochial limits. It is, then, imperative that every effort be made in school to broaden their outlook and to give them perspective.

The documentary film has had its greatest vogue in England, Canada, and Russia. John Grierson and Paul Rotha have pushed the documentary film in England until today respect for the British documentary film is high in cinema circles.

Some of the better known British documentary film subjects are: *Caller Herrin'* (Scottish herring fisheries); *Children on Trial* (juvenile delinquency); *The Grassy Shires* (farming and grazing); *Night Mail* (postal train); *The World Is Rich* (world food supply); *North East Corner* (Aberdeenshire farmers and fishermen); *A Thousand Million a Year* (customs); *Song of Ceylon* (life of the Singhalese); and *Weather Forecast* (weather forecasting).

Excellent documentary films have also been made in the United States by individuals, motion-picture companies, industrial concerns, and the various agencies and departments of the Federal Government. The United States Department of Agriculture has long been active in producing documentary films. A few of these films are *Fruits, Vegetables, and Co-operation* (co-operatives); *The Home Place* (America's abode from coast to coast); and *Democracy at Work in Rural Puerto Rico* (life on the island). The United States Wildlife Commission has just completed an international prize-winning documentary film, *It's the Maine Sardine.* Two outstanding documentary films produced by the Resettlement Administration should be mentioned. *The Plow that Broke the Plains* deals with the dust storms in the West, and *The River* deals with soil erosion and floods. Both are powerful dramas of human short-sightedness and its tragic consequences. The musical accompaniments are interpretative and the narrative is truly poetic. These films represent excellent class discussion materials and should be widely used.

The war added a tremendous impetus to the production of documentary films both in the United States and abroad, although no one should conclude that all war films are documentaries. The documentary

essentially deals with important social situations, developing an awareness and understanding of the situation, and providing a hint designed to have something done about it. Many of the films on conservation of natural resources fall into this category.

Recreational Films. In a way all films are recreational for some people, but the classification at this point includes films which amuse or entertain. They are the films produced for the commercial motion picture theater, but they are not restricted to theater use alone. Schools show many films of this type in their auditoriums and in connection with lunch hour and club programs. In the main these films are not produced to evoke any critical thinking but they may do so. A few such films are *The Howards of Virginia, The Story of Alexander Graham Bell, Stanley and Livingstone, Juarez,* and *Saratoga Trunk.*

Dramatic and Episodic Films. Schools have not used the dramatic film as much as one would expect, partly because there has been a fear of the cry that moving pictures entertain. In the second place satisfactory dramatic films have been singularly lacking. Doubtless many high-school students and teachers have seen the Yale Chronicles of American Photoplays. The fifteen films in this series were made several years ago and are silent films. They are historically accurate and have served a very useful purpose, but students in visual education classes who have evaluated these films critically in the light of modern film developments say they lack emotional warmth and dramatic appeal. Lighting and photographic effects are not always satisfactory. Some more recent dramatic films are *The Louisiana Purchase, Hamlet, Henry V,* and *Othello.*

In 1939, in response to a demand from educators, the Motion Picture Association of America, Inc., arranged for the release of a certain number of selected short subjects and excerpts from longer films for use in the schools on a nonprofit lease basis. The Commission on Human Relations of the Progressive Education Association studied educational needs and tried to match them against already produced Hollywood films. Although the motion picture producers refused to allow any of their full-length feature films (even noncurrent) to go to the schools, they did allow the Commission to select episodes or excerpts of varying lengths from these features. Thus, from the film *Captains Courageous,* two episodes were singled out for school use—life in a private school for boys, and the fish-hook incident at sea. These particular episodes were selected because

they dealt with specific and significant situations in human relations.

By 1950, Teaching Films Custodians, Inc., the distributing organization for these Hollywood films, was distributing 400 titles for classroom use. More than thirty thousand reels of these films are currently in use in the schools. During the brief span of operation Teaching Film Custodians, Inc., has liberalized its policies of distribution so that longer and longer excerpts of feature films are available for school use. Illustrative films of the dramatic or episodic type are: *Land of Liberty, Give Me Liberty, A Tale of Two Cities, The House of Rothschild, David Copperfield, Romeo and Juliet, Heidi, Johnson and Reconstruction,* and *The Crusades.*

Cartoon Films. The cartoon and animated diagram are techniques which have opened up vast possibilities as educational tools. The individual's imagination is not always equal to the demands made upon it for a lucid understanding of certain abstractions. The child is taught that the blood circulates through the body, and he is told or he reads about how it circulates, yet it is extremely difficult for him to get a clear concept of this circulation. The animated drawing can do a remarkable job of showing what actually takes place. Similar problems are evident in government, physics, geology, astronomy, and other fields, and in all of these the motion picture and especially the animated diagram can do what words and flat charts cannot do. We read about the process of atomic fission which underlies the explosion of the atomic bomb. The animation is the best possible means of depicting what actually takes place in this process.

Cartoons and animations have been turned to recreative as well as outright instructional purposes, and now delight millions of people. Walt Disney has brought clean and wholesome entertainment to people the world over through such creations as *Snow White and the Seven Dwarfs, Pinocchio, The Gay Caballeros,* and *Saludos Amigos.*

Among the films which use the animation technique and which are specifically curricular in conception are *The Traitor Within* (cancer), *Mother Goose Stories,* and *Your Ears.* These three are only examples of the many which are available.

News Films. Newsreels and newsbulletins are films that cannot be overlooked in a discussion of film types. Their use is growing rapidly, both in theaters and schools. Current events are important, and the film

medium ranks along with the radio and the newspaper as a means of keeping the public informed. The newsreel has temporary value to be sure, yet it also provides a historical record worthy of consideration for library use. Historians of the future will find the newsreel record of World War II invaluable to the understanding of the period of 1940 to 1945.

Slightly different, yet within the category of news films, are the productions of the *March of Time*. In the main, these films deal with a current issue but they also delve into its background and thereby present a rather complete analysis of the issue. They might appropriately be called news-bulletins.

Scientific Films. In presenting scientific films as a separate category, the writer is well aware of the fact that again there is an overlapping of film materials, yet there are numerous films produced by and for special scientific groups that transcend the usual classroom use. Hospitals, medical associations, and research bodies are making an extensive use of film materials. The American College of Surgeons has developed a series of films for instruction in surgical technique. Numerous other medical films grew out of the treatment of unusual cases during the war, both in surgery and internally with diseases such as malaria and venereal infections. Plastic surgery and blood transfusion have contributed a number of interesting films. Other sciences, such as psychology, have found the motion picture extremely helpful in teaching. Technical psychological films are now available in such areas as measurement, animal study, neurology,



A scene from *The Body Fights Bacteria*, in *Textbook on Healthful Living*, Diehl.

COURTESY OF MCGRAW-HILL TEXT FILMS

child study, guidance, and clinical applications. From the hospitals, laboratories, universities, and research institutes come scientific films designed to provide better understanding and to extend the bounds of knowledge.

Industrial and Sponsored Films. There is some question as to the wisdom of schools using films produced by industrial concerns which directly or indirectly advertise the products of the firm. Many city school systems refuse any and all of the films as a matter of policy. Other districts, perhaps smaller and less wealthy, use them gladly. Almost all of the large corporations have a variety of these films which they lend or donate to schools. These include International Harvester, General Electric, United Fruit, American Can, and Aluminum Company of America. In some cases these films may be obtained directly from the company or from a film depository such as the United States Bureau of Mines.

A typical industrial film is *The Story of Sulphur,* a two-reel film produced by the Texas Gulf Sulphur Company. Reel 1 shows the mining of sulphur from deposits a thousand feet below the surface by means of compressed air which forces up sulphur which has been liquefied by superheated water pumped down from the surface. The liquid sulphur is then conveyed to large storage vats where it solidifies. This solid mass is then blasted apart and loaded into railroad cars by buckets. Reel 2 deals with the uses of sulphur, as in the manufacture of sulphuric acid, in the preparation of dried fruits, in the rubber industry, in explosives, and in paper manufacture. Such a film may be of very high value to students in chemistry or economic geography. The advertising is inoffensive and the treatment of the subject of sulphur comprehensive.

Another term which might appropriately be substituted for "industrial" film is "sponsored" film. In fact sponsored film is the preferred term because the type of film material under consideration here is not limited to industry but includes all subsidized films made by special interest groups. As was suggested in the second paragraph above, the place of the sponsored film in the school, regardless of its informative value, is highly controversial. Twenty-three outstanding educators met in Detroit on April 4–6, 1946, to consider the adoption of a uniform policy toward the sponsored film. The following "suggested policy" was adopted:

> Public schools should serve the interest of all the people. Therefore, instructional materials used should be free of the influence of special interests.

> Audio-visual materials, particularly films, subsidized by special interest groups, are being offered to the schools in increasing quantities. Some of these materials do have significant instructional values and do offer experiences not otherwise available. The use of the best of these, however, involves furthering the sponsor's interest in some degree.
>
> Schools cannot develop adequate audio-visual programs based solely on sponsored materials. Indeed, too great an acceptance of sponsored films will retard the development of the nonsponsored educational film enterprise.
>
> The use of a sponsored film can be justified only in terms of bringing to the learner a valuable experience that would otherwise be denied to him. Constant care must be exercised in weighing the educational value of a film against the furthering of the sponsor's special interest.
>
> The final determination of whether or not sponsored audio-visual materials shall be used and the conditions under which they shall be used is a matter for local decision. Each school system has a responsibility for developing its own criteria and policy with regard to such materials.

The conference also offered the following considerations for determining the educational value of sponsored audio-visual materials:

1. To what degree do the objectives of the material harmonize with the educational objectives of the school?
2. Is the material:
   a. Accurate and authentic in fact?
   b. Representative in its selection of fact?
   c. Truthful and sincere in treatment?
3. Does the material present general understanding, facts, processes or methods, or does it present a particular point of view or promote a specific brand?
4. To what extent is the material sound in terms of educational philosophy?
5. To what extent is the material significant in the sense that it promotes an educational program better than any other material generally available at the time?
6. Is the material adapted to the needs, interests, and the maturity level of the students who will use it?
7. To what extent is the sponsor's relationship to the materials clearly known and acceptably stated?[1]

In considering the faults of the sponsored film, most teachers immediately think of films which carry advertising, either in the form of narrator commentary, titling, or clever introduction of products or trade name so

[1] "A Suggested Policy with Regard to Sponsored Audio-Visual Materials Offered for School Use." Report of Detroit Conference, April 4–6, 1946. Copies of this report may be obtained from Arthur C. Stenius, 467 West Hancock Street, Detroit 1, Michigan, at five cents each.

that the audience remembers the product. The advertising is probably not objectionable as advertising because film producers are too clever to fall into such error, yet the advertising, even though subtle, is there. In addition to this weakness, Corey lists five others; (1) sponsored films are usually designed for heterogeneous audiences since the sponsor wishes to have his film appeal to all people everywhere, (2) titles are frequently misleading and have no relation to the film content, (3) these films try to cover too many topics, thereby often resulting in a hodge-podge rather than a few clear concepts about a specific topic, (4) the sponsors are unduly influenced by entertainment film techniques, and (5) such films are usually too long. The majority of the instructional films are one reel in length, whereas, the majority of the sponsored films range from two to four reels.[2]

Provocative Films. The most recent type of film to make its appearance is one designed chiefly for discussion purposes with film forums and councils. In the main it serves the purpose of the adult study group, but it may also be appropriately employed with students in school, particularly in such areas as the social studies, occupations, ethics, etiquette, or current events. As the name implies, this film raises problems or questions in such a manner as to provoke frank discussion. The film may or may not offer possible solutions to the problems raised. The National Film Board of Canada has done much of the pioneering work with this type of film.

A recent film made in the United States for schools, *Dinner Party,* follows this technique. *Dinner Party* deals with table etiquette. It raises question after question as to what is correct in the matter of seating, serving, use of cutlery, conversation, and removal of dishes from the table. Six actors and actresses and a waitress follow different manners and the narrator raises questions of why, which, and what? When the film ends no answers have been given, but the issues are squarely before the audience. Discussion logically follows. The producer has provided a four-minute trailer which may be shown at the time the film is screened or at a later time to answer the questions raised and summarize the entire film. Other interesting films following this technique are *You and Your Family, You and Your Friends,* and *Where Will You Hide?* In

[2] Corey, Stephen M., "Sponsored Films for Schools," *Film and Radio Guide,* 12: 12–15, April, 1946.





COURTESY OF ENCYCLOPEDIA BRITANNICA FILMS, INC.

Two shots from film *Where Will You Hide?* designed to shock and provoke the audience to discussion of world peace.

the main this type of film serves its greatest usefulness when it deals with socio-economic-political content.

SUBJECT AREAS

It has long been noted that film materials were abundant in certain curricular areas, and that other areas were almost devoid of suitable materials. The natural sciences are reasonably well-covered, but literature and mathematics have lagged behind. Reasons for this are obvious. Science is a topic which lends itself to film treatment rather naturally and mathematics does not. Film materials in literature have been the object of feature pictures produced in Hollywood. These productions have not been entirely (actually only slightly, and in some cases not at all) satisfactory for classroom use, because Hollywood employs a certain technique which may or may not truly represent the book being filmed. Distortións are so frequent and so flagrant that English teachers are not too favorably impressed with Hollywood's literary film production. Another important factor here is that apparently Hollywood refuses to make any but the most dramatic titles into films. It should also be pointed out that Hollywood has been reluctant to allow much of its literary film production to reach the classroom.

The Laurence Olivier film, *Hamlet,* is a literary film that seems to be an exception to the rule of nonacceptability by English teachers. Everywhere this film is acclaimed by teachers. Its accuracy and interpretation are unparalleled. As a learning technique it ranks above stage productions of the play. It skillfully employs every stage and camera device in vogue.

Another factor which has caused science film production to lead other

subjects is the fact that science teachers, generally speaking, have a better understanding of the values of audio-visual techniques and, therefore, actually make greater use of the materials which they have. Most science teachers, too, understand the operation of projectors. Film producers make the films which are used and in demand.

The following table gives a ready reference concerning the availability of audio-visual materials by certain subject areas. This table is illustrative rather than definitive.

Table I. Availability of Audio-Visual Materials by Subject Areas

Subject Area	16-mm. Motion Picture Films	Filmslides	Slides	Recordings
Aeronautics	X X X	X X X	X	
Agriculture	X X X	X X	X X	
Art	X	X X	X X X	
Biological Science	X X X	X	X X	
Commercial Education	X	X	X	X
English Composition	X			X
English Literature	X X	X	X	X X
Foreign Language	X X		X	X X X
General Science	X X X	X X X	X X X	
Geography	X X X	X X	X X X	
Health and Hygiene	X X	X X	X	
History	X X	X X	X X	X
Home Economics	X X	X X	X	
Industrial Arts	X X X	X X X	X X X	X
Mathematics	X	X	X	
Music	X X			X X X
Nature Study	X X X	X X	X X	X
Physical Education and Sports	X X	X	X	
Physical Science	X X X	X X	X X	
Primary and Lower Grades	X X X	X X	X X	X X X
Safety	X X	X X	X X	X
Vocational Guidance	X X X	X X X	X X	X

Legend: X — Few Materials
X X — Fair Amount of Materials
X X X — Abundant Materials

Film World Magazine conducted a questionnaire survey in 1945 in which the heads of visual education departments in schools, colleges,

and other educational institutions were asked "What are the greatest needs in the field of visual education today?" Many interesting replies were furnished by this survey. The tabulation of results of the survey lacks specificity but three generalized statements may be of much value: (1) 67 per cent of the replies stated that the greatest need of today is better teaching films, (2) 45 per cent said that *more* teaching films are needed, that the field is far from covered, (3) 38 per cent requested more specific subject matter in films.[3]

One of the first problems raised by the Commission on Motion Pictures, which was established by the American Council on Education with a Hollywood subsidy in 1944, was that of film needs by subject areas. A year after the Commission was established, the director reported that there is need for new productions in the fields of democracy, geography, English, mathematics, art, and health. The Commission eventually drew up film treatments and production plans for educational films in the following areas: (1) A series of 50 treatments or scripts on global geography intended for the junior high school, (2) A series of 39 production outlines and preliminary film treatments on The March of Freedom for use in courses in problems of democracy in the senior high school, (3) Educational specifications for 7 films on algebra and 9 on geometry, (4) Educational specifications for twenty-one films on art, (5) Educational specifications for a series of fifteen films on music. As the studies of the Commission progressed, its plans were modified, but eventually it released 141 film plans, material for 117 films. Five years later the Commission disbanded.[4] Of the plans originated only thirty-six films have been produced to date. In 1948 and 1949, United World Films produced these films in a series entitled "The Earth and Its Peoples." Additional titles in this geography series are promised.

This discussion of films and subject areas cannot be complete without calling attention to the fact that many leaders in visual education feel, as many classroom teachers may, that there is a distinct need for a large number of films which are not closely and directly related to courses of study and curriculum. This position is closely related to the philosophy of education sometimes labeled "progressive," which tries to organize instruction around dynamic life problems and challenges instead of

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[3]*Film World*, 1: 48, March, 1945.

[4]May, Mark A., *Planning Films for Schools—The Final Report of the Commission on Motion Pictures*, American Council on Education, Washington, D. C., May, 1949, 32 pp.

around subject matter. The traditionally organized curriculum and instructional techniques rely upon rather narrow subject-matter content, whereas, the other type of organization uses subject matter secondarily in solving problems. This approach employs a much wider range and a more diverse subject content. It is easy to see that instructional films may follow one or the other of these educational philosophies. One may be actually referred to as the "text film" and the other the "problem film." Paul Reed, in referring to experience in a particular instance, writes:

> There were many instructional motion pictures that had been produced to correlate directly with the existing curriculum, and these could be used and were used effectively; there also were other motion pictures of generally accepted technical and educational effectiveness. These latter pictures, however, were useful in achieving generalized teaching objectives, but they did not correlate with the specific objectives of accepted subject matter areas such as English, social studies, science, and mathematics. Efforts to encourage the use of this kind of picture met with obstacles of subject-matter-organized leadership, courses already filled with factual content, and demanding final examination.[5]

Many other educators recognize the dilemma between the "text" and "problem centered" film. Francis and Elizabeth Noel have stated the problem forthrightly in a recent article:

> If school people continue to insist on a strictly *academic* approach to the production and use of audio-visual materials to further fortify existing concepts and traditional patterns of education, they will miss the intrinsic values and full potentialities inherent within the materials themselves. If this happens, then agencies outside the schools that use such materials because of these values, will by the sheer weight of their *extensive* use of them exercise more influence on the behavior of children and adults than will the schools. This situation even now challenges institutionalized education.[6]

As curriculums change and as the guidance of learning activities changes, audio-visual materials will change. At present, there is great need for both the "text" and the "problem" materials. In the first category, there are such excellent films as *Digestion of Foods, Nitrogen Cycle, How the Ear Functions,* and *Territorial Expansion of the United States,* and in the second category, *The City, World of Plenty, Man—One Family, Our Shrinking World,* and *Mary Visits Poland.*

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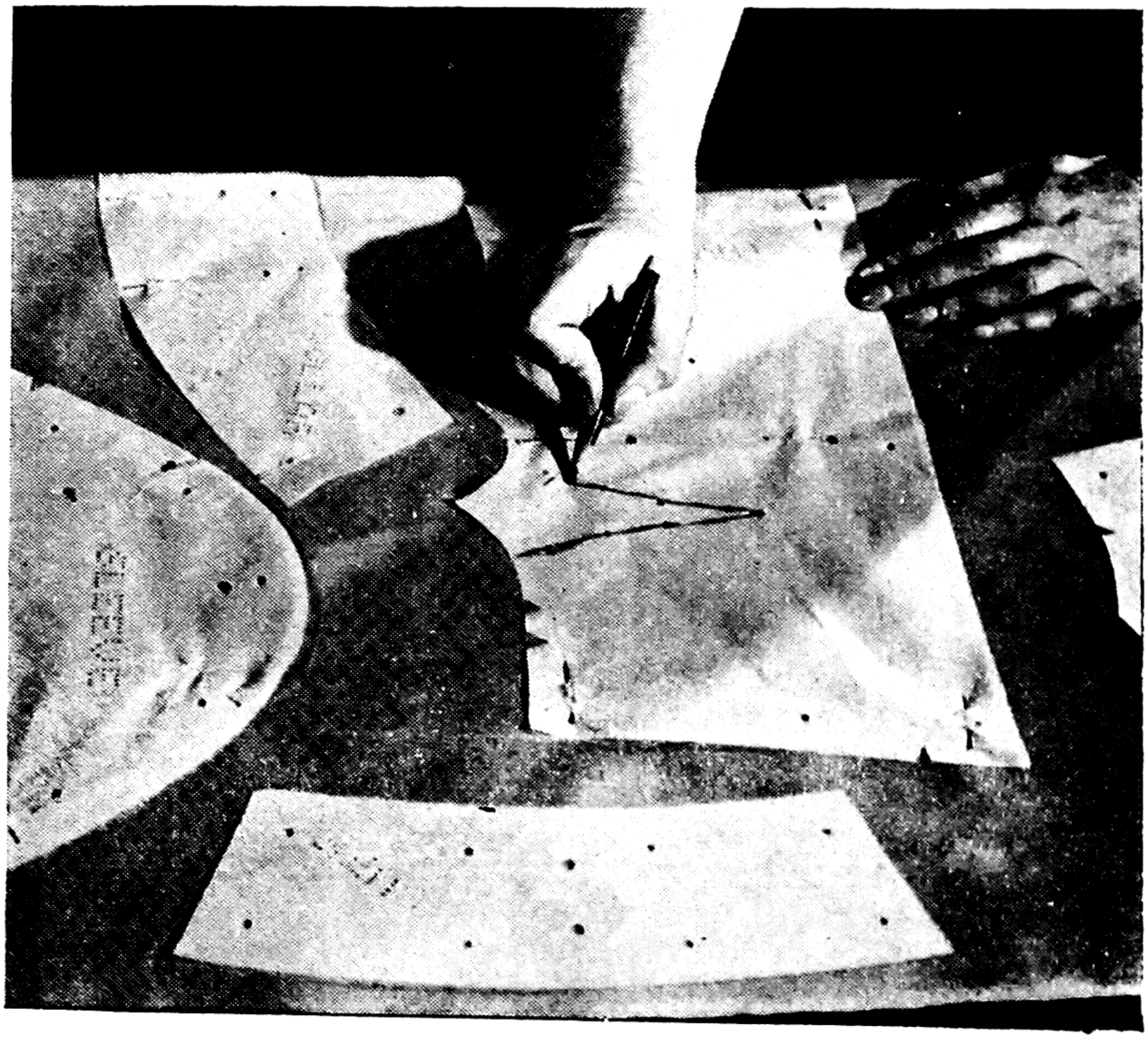
[5] Reed, Paul C., "Motion Pictures and Curriculum Change," *Educational Screen,* 25: 182, April, 1946.

[6] Noel, Francis W., and Elizabeth G., "Looking Ahead Twenty-five Years in Audio-Visual Education," *Educational Screen,* 25: 79, February, 1946.

PRODUCERS OF INSTRUCTIONAL FILMS

Sources of instructional film production are expanding rapidly. A decade ago producers of instructional films could be counted on the fingers of one hand. Today there are two or more scores of such producers. These sources can be classified as follows: (1) educational institutions—colleges, universities, and schools, (2) Hollywood (through Teaching Film Custodians, Inc., or the Commission on Motion Pictures of the American Council on Education), (3) governmental agencies—especially the United States Department of Agriculture, (4) large private corporations which make instructional films solely, (5) small private companies which turn out from two to a dozen films a year, (6) theatrical companies (not to be confused with Hollywood) which produce both theatrical and instructional films in limited quantities, (7) private individuals, (8) foundations, (9) industries which sponsor films—these indirectly, if not directly, advertise the industry, (10) educational or welfare organizations such as the Tuberculosis Association, and (11) textbook publishers.

One textbook publisher has produced a series of motion picture films and filmstrips correlated with certain textbooks. Each film is accompanied by a follow-up filmstrip. These films are intended primarily to enrich the instructional material in the respective texts. Teachers using this material



Teachers find films on selecting materials, using a pattern, sewing seams, etc., interesting and valuable aids for their students.

COURTESY OF YOUNG AMERICA FILMS, INC.

now have a trinity of text, sound motion picture film, and silent filmstrip, not unlike the materials prepared by the Army and Navy for their trainee instructors—manual, sound film, and silent filmstrip.

Films of the above type produced under the direction of an author of a text will place "film texts" on a co-ordinate level, educationally and scientifically speaking, with textbook authorship. This, in fact, will correct one of the perennial complaints of educators who point out that films are made by technicians who do not know content nor pedagogy. This type of joint text and film authorship opens up great potentialities for richer and more meaningful learning. It is interesting to note that Charles F. Hoban, Jr., reports the late Ben G. Graham, Superintendent of Schools in Pittsburgh, Pennsylvania as saying:

> If a representative of a textbook company should come into my office and tell me that he had not only a set or sets of textbooks that fit into the Pittsburgh curriculum, but also sets of films that correlated with these books, I would immediately give him a serious hearing and his offerings serious consideration. In considering textbook adoption, preference would be given to the combination of correlated films and books.[7]

Hoban is of the opinion that correlating the text and film can be a worth-while development only if the film steers clear of certain basic psychological characteristics of textbooks which he lists as impersonal, abstract, dull, difficult, and written by authorities who are not writers. He fears that "textfilms" in the hands of the same authors will have the same faults. Then, using a series of "counterpoints," Hoban lists the

[7]Hoban, Charles F., Jr., "Films and Textbooks," *Educational Screen*, 24: 445, December, 1945.



Children learn through films how man performs the world's work.

COURTESY OF ENCYCLOPEDIA BRITANNICA FILMS, INC.

criteria of good "textfilms" as, "(1) motion pictures should, wherever possible, be made personal, (2) films should reflect the details and context of the subject, not merely set forth the end-result generalizations, (3) educational films should scrupulously avoid condensation—packing more material into a film than can be absorbed by the audience in the running time of the film, (4) educational motion pictures should be produced by professional film producers, not by subject-matter specialists or specialists in teaching the subject matter. Both these educational specialists are indispensable to educational motion pictures—but their service is in the beginning, planning the technical supervision, and the final approval for accuracy and teachability, . . ."[8]

SCHOOL-PRODUCED MOTION PICTURES

Producing motion pictures at the school by pupils, teachers, and administrative officials is a worth-while and promising activity. Although at first glance this may appear to some as an impossible undertaking, such is not the case. As early as 1938, Hardy R. Finch, English teacher in the Greenwich, Connecticut, High School, reported that more than two hundred schools throughout the United States had already produced three hundred and seventy-four films. The activity grew rapidly and Finch predicted that before many years passed, practically every school in the country would be making or will have made its own film offerings.

This prediction was somewhat over-optimistic, but a great many school films are being made each year. The production of 16-mm. motion pictures is, of course, relatively new. It was not until 1923 that the first 16-mm. motion-picture camera was made in the United States. Amateur photographers all over the country took up production of homemade motion pictures as a hobby. Many of these amateurs were teachers in schools and colleges, and the making of motion pictures in the school naturally followed.

Types of School-Produced Motion Pictures. Schools produce many types of films, embracing nearly every aspect of the school's work and activity, and ranging from kindergarten to college. The newsreel and publicity type is common. This type of production shows a school activity or a number of activities and is frequently used in acquainting the public with the school. A few examples of these films are those produced by the

[8] *Ibid.*, pp. 445–46.

Forest Hills Schools (Pennsylvania), Dearborn Schools (Michigan), and Brookline Schools (Massachusetts). The effect of these productions on public relations has been uniformly satisfying. Another newsreel type is used to record the activities of the school or a particular class for showing at commencement time and for inclusion in the archives of the school for permanent record.

Schools are also attempting to produce teaching films. Nearly every subject in the curriculum has been filmed: science, safety, history, health, reading, arithmetic, English, and others. The John Hay High School of Cleveland has done outstanding work in filming typewriting and shorthand skills. A teacher in Milwaukee arranged a film dealing with the teaching of fractions. China as a teaching unit was filmed by the Manual Arts High School of Los Angeles. This film included a trip to Chinatown, a Chinese restaurant, Chinese art, costumes, and the production of a small Chinese play. The Fordson Public Schools of Dearborn produced a film with the title, *Our Children Learn to Read.* Motion pictures dealing with health and safety have been numerous. One school alone produced a series of films with such titles as *Care of the Hair, Care of the Nails, Do You Walk or Do You Hobble?, Just a Cold, Do You Know Your Heart?,* and *First Aid.*

Dramatic films have been attempted in some instances. A few of these are original themes, but, in the main, schools have held to the classics. In some cases only a few scenes of a book such as *David Copperfield* were attempted. In other cases attempts were made to film the story as an entity. A junior-high-school class in Louisville, Kentucky made a full-length film of *The Lady of the Lake.* The project was completed in three months. Lane Technical High School in Chicago has filmed selected episodes from *Canterbury Tales. Robin Hood, Little Women,* and *Heidi* were the bases of films produced in another school.

For the last four years the American Museum of Natural History in New York has held a contest for schoolmade motion pictures. "Oscars" are awarded the winners. *Emphasis on Science* produced by the Arista Film Committee of George Washington High School in New York was the 1946 winner, and *Reactions in the Frog* produced by the Evander Childs High School, New York, was the 1947 winner. Other awards in 1947 were *Assignment for Tomorrow,* Commerce Camera Club, Manhattan High School of Commerce; *Power or Perdition,* Camera Club, Forest Hills High School, Queens; *This Is My School,* Cherry Lawn

School, Darien, Connecticut; and *Washington Heights*, George Washington High School, New York. Other films produced by these schools include *All on a Summer's Day, What Bird Is That?, They All Go to Evander, Introduction to Poetry, This Is Forest Hills, Teachers Are Human,* and *The Case of the Juke Box.*

This is only a brief cataloging of school-produced motion pictures. Some of the filmings have been limited to only a few feet while others have gone up to three thousand. The range of material for such work is practically limitless.

School-produced motion pictures can be classified in other ways than by subject matter. Some of the films are designed almost wholly for public relations, as was mentioned above. Others are produced more as extracurricular activities by camera, cinema, or dramatic clubs. Instructional films apparently fall into two classes—those which are produced for their immediate value and those produced for more lasting purposes. The former justify their production from the study, co-operation, and interest which they provide for those who participate, but the production has little value for other groups or classes in subsequent years. The other type of production is more elaborate, more comprehensive, more finished, and is designed to serve as a medium for instruction with other groups. A motion picture built around a class prophecy or a class history for commencement would exemplify the first type; one of *Canterbury Tales*, typing techniques, or guidance, the latter.

These eighth-grade boys are making a motion picture as part of their study of cameras, lights, composition, and related photographic learnings.

COURTESY OF GLENCOE, ILLINOIS, PUBLIC SCHOOLS



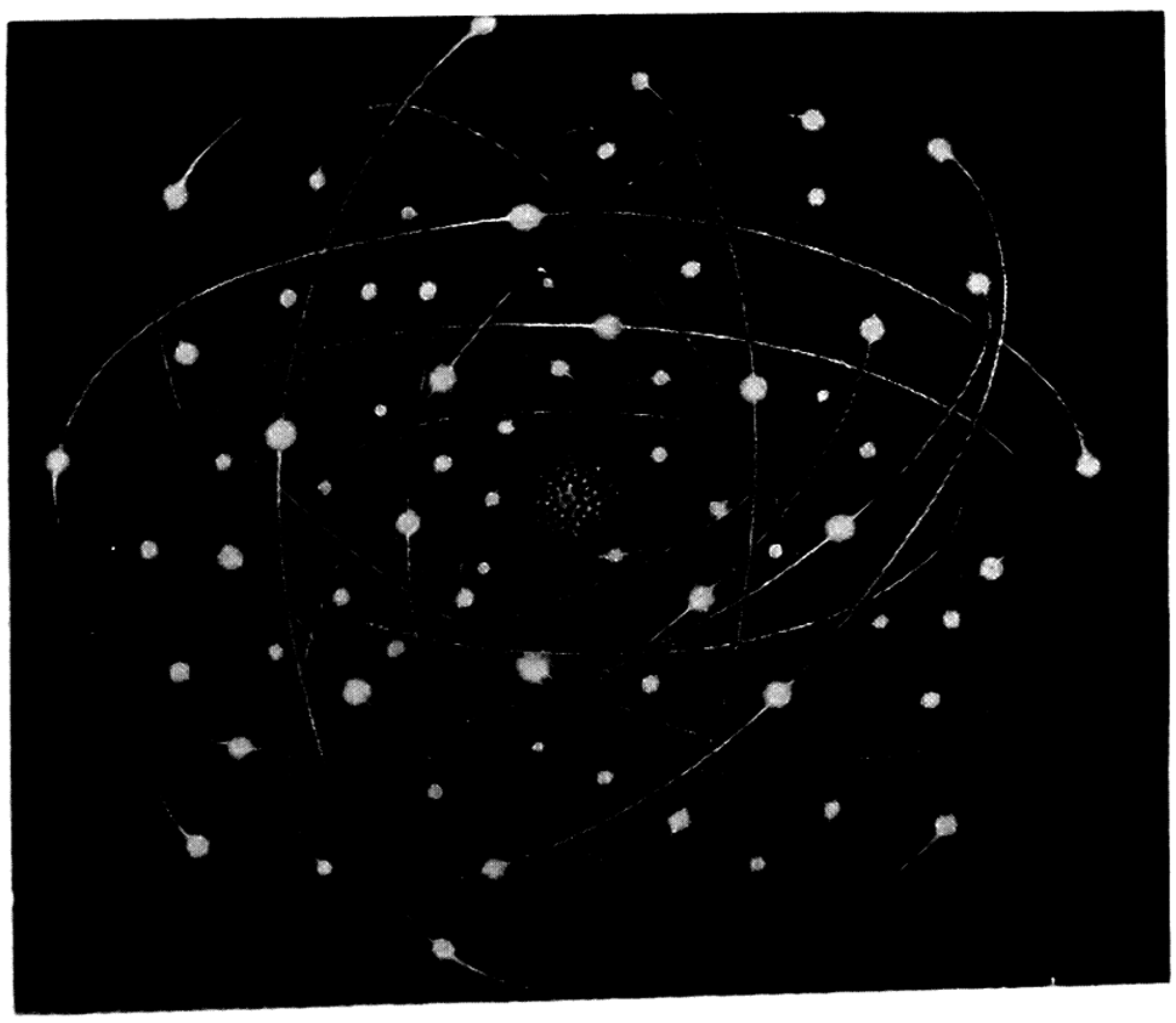
Educational Values. But just what are the educational values of motion picture production in an elementary or secondary school? Co-operation stands out as one of the great lessons to be learned from the making of a motion picture. This co-operation will involve some of the following groups: parents, community clubs or organizations, local amateur or professional photographers, administrative officers, supervisory officers, teachers, and pupils. In the actual production there must be closest co-operation between the participants (artists), cameraman, light man, costume designers, property and set men, script writers, researchers, and directors. A class undertaking the filming of the story of clothing, for example, will organize into committees and subcommittees until every one of the multiple aspects of the production has been taken care of. The community is quite likely to be affected, interested, and drawn into the undertaking. The junior-high-school class at Louisville which filmed *The Lady of the Lake* had to locate a lake and obtain permission to use it, locate hounds, consult with the zoo officials to film a stag, find and obtain permission to photograph certain types of architecture, and seek the donation of the use of horses from a riding academy.

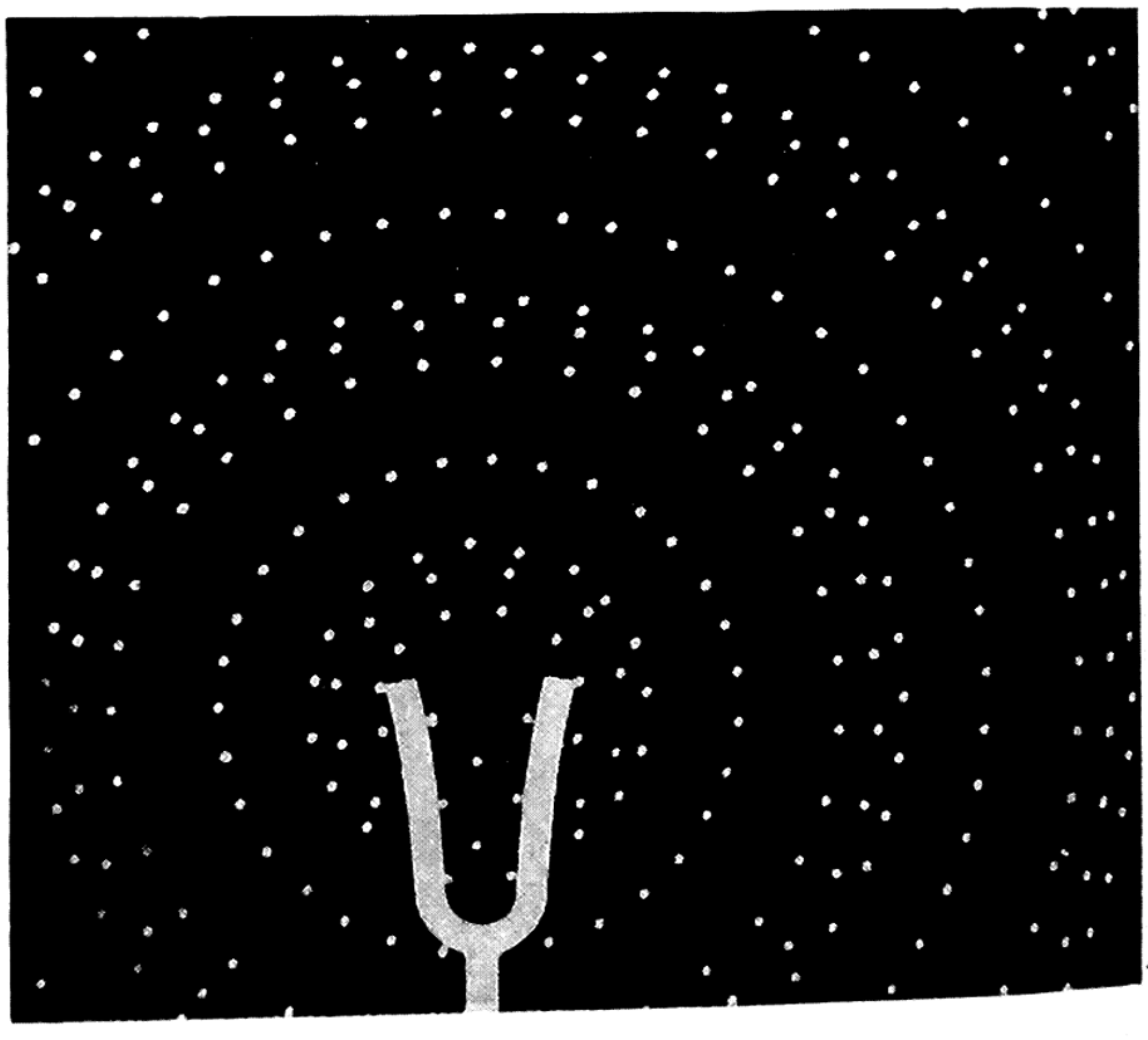
Research and background study are involved in the making of motion pictures. A Western Pennsylvania class studying colonial history or Indians might undertake a film project dealing with Chief Cornplanter and his relations with the settlers. Costumes, utensils, implements, foods, symbols and ornamentation, animals, wigwams, social customs, festivals, councils, and a dozen other things would be involved. How did the Corn-

A scene from the educational text film *Atomic Energy*

A scene from the film *Sound Waves and Their Sources*

COURTESY OF ENCYCLOPEDIA BRITANNICA FILMS, INC.





planter Indians make a bow? What kind of wood was used? How was it seasoned? How was the bowstring made? As a result of the detailed study necessary to learn how a bow was made, students would have a clearer understanding of the hand-economy of primitive peoples. Every cinema project has its own research problems.

Need it be mentioned that cinema projects generate interest in the work? Only a hopeless dullard will fail to catch the spirit. These and many other splendid educational benefits are opened up at once.

Equipment, Costs, Scenarios, and Know-How. Most schools producing motion pictures have relatively little equipment, although costs are not exorbitant. No one should get the idea that producing a motion picture is an easy matter. Much skill and ingenuity are necessary; but with suitable equipment, proper planning, some counsel, and a willingness to learn, any principal, teacher, or photoclub should be able to produce acceptable results. Correct exposures, good lighting, and sharp focusing are essentials. A step-by-step outline in producing a film follows:

1. Select the subject carefully. The better the subject the better the film is likely to be. Is motion necessary to the treatment of the subject? Can the proper scenes be procured?

2. Prepare the scenario as a specific plan of action. It is a simple, narrative description of the method by which the film message will be presented. It may take one of several forms and it may be more or less detailed. Usually the preparation of a scenario and a shooting script requires research, effort, and creative ability. But a script is needed to organize the project, thereby preventing film and time wastage. It is insurance against over and under emphasis on certain scenes. It is the blueprint for the production. Few contractors will attempt to build a house without a plan. In like manner, a film must be planned. Sample copies of scenarios which have been successfully used are available and should be carefully studied.

3. A "story board," although not as commonly used as the scenario, is helpful. It is a series of small sketches of the scenes in the proposed film, arranged in sequence. This device helps the planners to visualize their ultimate product.

4. The co-operation of other school departments is essential because there are so many ramifications to the production of a film that all possible help will be needed. The English department can write or edit the script

or continuity, the speech department train the actors, the art department arrange scenery, the manual training department make the sets.

5. Check over the equipment. An exposure meter is a necessity. It is next to impossible to guess light values. Without a meter there is likely to be much wasted film, overexposed or underexposed film necessitating retakes, and other annoyances.

6. A tripod for the camera is also an essential. Good photographers say that cameras should never leave the store without tripods. In scenes where a tripod cannot be used, hold the camera as steady as possible. Try to keep the "wobble" out of your pictures.

7. Keep the camera in perfect working order. Lenses must be clean at all times.

8. Follow the script.

9. Actors should rehearse their parts—locations and actions so that they can carry through their actions with a minimum of lost time, retakes, and wasted film. Action must tell the story.

10. Avoid large groupings. Camera and lighting limitations make such filming difficult.

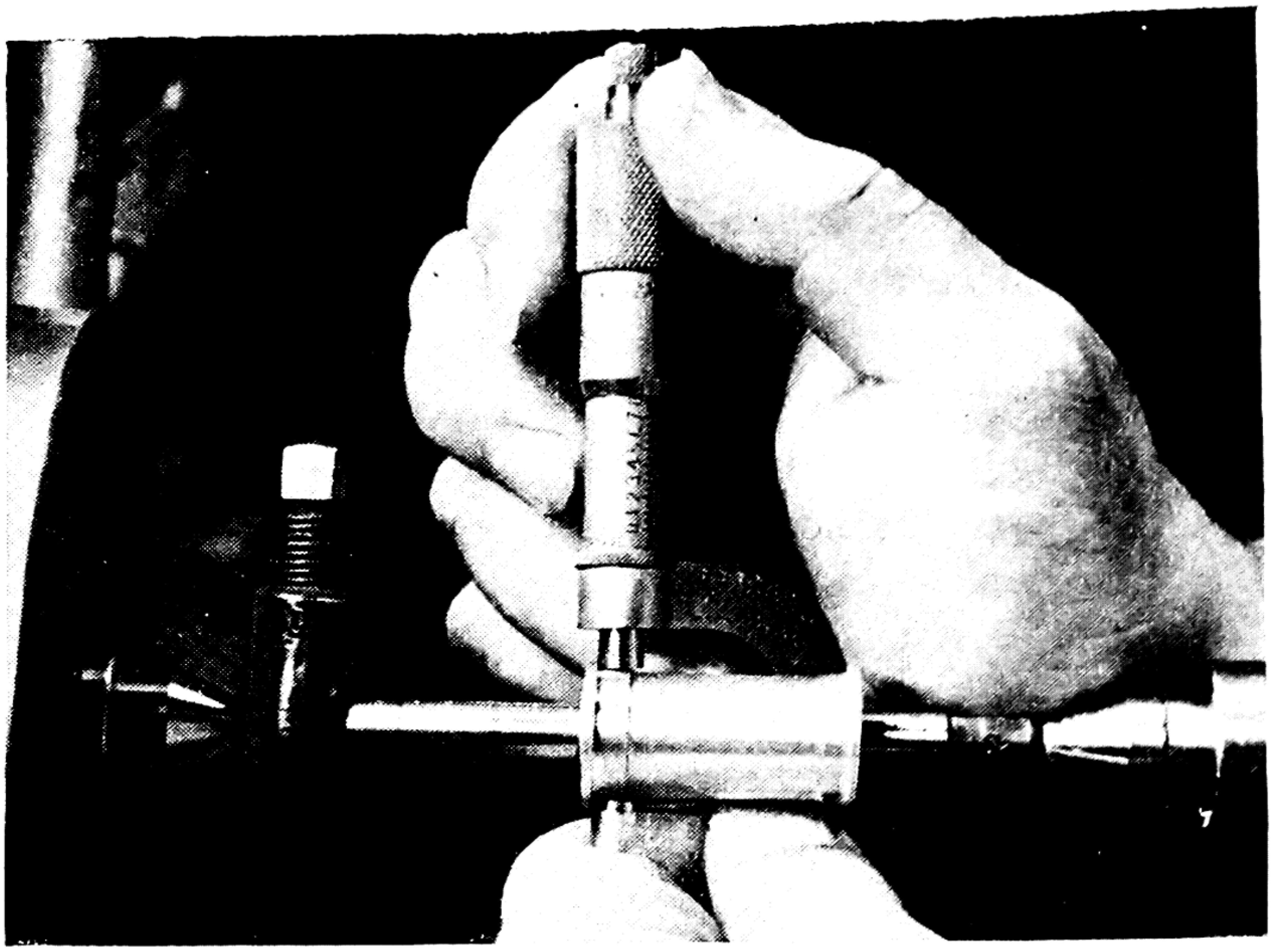


These boys are getting ready to shoot a picture of their school. Note their equipment.

COURTESY OF CHERRY LAWN SCHOOL, DARIEN, CONNECTICUT

The film *The Micrometer* shows the various steps in applying the micrometer and in reading measurements.

PRODUCED BY U. S. OFFICE OF EDUCATION



11. Arrange each scene so that it is complete—a story in itself, so to speak. A few feet of film here and a few there are unsatisfactory.

12. Study each scene carefully and place the camera so that interesting results can be obtained. Angle shots are usually more satisfactory than those taken "head-on."

13. Close-ups and enlarged sections of the areas to be emphasized provide interest and vitality. Introduce colorful and artistic touches, particularly if the film is to be in natural color.

14. Normal speed should be used for most work. Some fast action scenes may be improved if slowed down to half speed.

15. Send the film to the factory for processing.

16. Begin editing the film. Don't be afraid to cut out all irrelevant frames. Scenes involving poor acting or poor photography should also be taken out, and retakes made.

17. Prepare attractive and appropriate titles. Titles should be closely checked for clarity. They should be relatively short, concise, and vivacious.

18. Splice carefully. Use a standard splicing outfit and good cement.

19. Some authorities recommend that the editing be done on a first print called a "scratch film." In this way the negative is saved from scratches, dust accumulations, and handling. After the "scratch film" has reached its final editing and is in acceptable form, the negative is cut to match. In this manner perfect reprints are obtained from the negative if more prints are needed. "Dupe" prints are perhaps unnecessary if the film is not destined for extensive use.

Film Production in the Denver Schools. Every teacher or school which contemplates making a school motion picture should consult the Report on Film Production in the Denver Schools which was prepared under the aegis of the American Council on Education. The report is both an informative account of a valuable curriculum project and a handbook on motion picture production. As the former, it details how the Denver students and teachers filmed certain significant community problems and activities, and of the values of these activities to the students, schools, and the community. In a foreword to the report, Charles E. Greene said:

> The results of the student production of motion pictures have exceeded the possibilities foreseen when the program was planned. . . . Production of films by high school general education classes has been a worth-while experience for both students and teachers. Interest has been sustained at a high level over a long period of study in the classes that "made movies." The finished films are in constant use throughout the junior and senior high schools in the study of community resources, and they have proved invaluable as a means of interpreting the school curriculum to parents and to other community groups.[9]

As a handbook, the Denver report describes in detail every phase of production, including such topics as film and film costs, silent vs. sound motion pictures, all types of equipment, outlines and scenarios, suitability of topics for filming, sequences and transitions, "shots," lenses, location, editing, titling, adding a sound track, and complete costs. An entire chapter is devoted to technical considerations of the camera and its use.

The Denver High School students made three films. *It's Fun to Play, How Our Health Is Protected,* and *Food the Modern Way*. The report ends with this significant paragraph:

> When we fully understand it, the motion picture offers much to education as an instrument of instruction, as a mode of self-expression, as a permanent record of passing events, and as an instrument for educational testing. The production of motion pictures is but one aspect of the role of motion pictures in education. The development of pictorial literacy is no less a task of our civilization than the development of verbal literacy, and in this development the proper use of the camera is an important step. The development by educators of a proper understanding of the role of motion pictures in education and the role of motion picture production in education is one worthy

[9] Brooker, Floyde E., and Herrington, Eugene H., *Students Make Motion Pictures,* p. V, American Council on Education, Washington, D. C., 1941.

of further consideration. This report may serve as a steppingstone to adventure for the individual teacher in the free play of imagination and initiative in this field.[10]

Amateur Cinema League. So much interest has been developed in amateur cinematography that there has been formed an international organization with headquarters in New York City, the Amateur Cinema League, Inc. It has no affiliations with national or local clubs, but has individual members all over the world. The League has published a variety of pamphlets and bulletins on such phases of cinematography as editing, exposures, filters, lenses, and film. It also publishes a monthly journal, *Movie Makers*. Other services include a handbook on making movies, technical consulting service, and a film exchange for members. The organization is a clearinghouse for amateurs the world over. Schools contemplating the making of a film would do well to write the League.

Another valuable source of information is the monthly issues of *Educational Screen* which carries a department headed "Schools and Motion Pictures." In it each month, the editor discusses the problems of school-made films.

SOURCES OF FILM INFORMATION

Information concerning the availability and evaluation of motion pictures for educational purposes is extensive. At least a dozen standard reference books list sources. Under the circumstances, it would seem unnecessary to do more at this time than to list some of these sources.

General Source Material.

Catalogue of Films for Church and Community Use, Religious Film Association, Inc., 45 Astor Place, New York 3, N. Y. An annual catalog which lists religious motion picture films, filmstrips, and slides.

Chandler, Anna C., and Cypher, Irene F., *Audio-Visual Techniques,* pp. 219–41. Noble and Noble, Publishers, Inc., New York, 1948. Listing of state and regional distribution centers, museums, and equipment companies.

Consolidated List of Free Films, DeVry Corporation, 1111 Armitage Avenue, Chicago, Ill. Helpful but not comprehensive.

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[10] *Ibid.*, p. 142.

Dent, Ellsworth C., *The Audio-Visual Handbook*, pp. 199–222, Society for the Study of Visual Education, Inc., 100 East Ohio Street, Chicago. An extensive listing of film producers, commercial distributors, and college and university distributing centers.

Bernhard, Frederica, *Education Films in Sports*, Educational Film Library Association, 1600 Broadway, New York 19, N. Y., 1945. A listing of sports teaching films along with brief descriptions and appraisal.

The Educational Film Guide, The H. W. Wilson Company, 950 University Avenue, New York 52, N. Y. An annual basic library guide which gives the location and distribution source of practically every film produced. The material in the annual volume is cumulated from monthly issues of a journal.

Educator's Guide to Free Films, Educators Progress Service, Randolph, Wisconsin. Listing is revised annually. The list contains several thousand free films and filmstrips, descriptions, and distribution sources.

Evaluation Project, Educational Film Library Association, 1600 Broadway, New York 19, N. Y. An extensive evaluation service which is mailed out periodically to subscription members. Films are annotated and evaluated by visual educationalists throughout the country. Rates on application.

Film World Film and Industry Directory, 1949–50, C. J. Ver Halen Publishing Company, 6047 Hollywood Blvd., Hollywood, California. A world almanac of films, producers, distributors, dealers, libraries, equipment, and information.

Haas, Kenneth B., and Packer, Harry Q., *The Preparation and Use of Visual Aids*, pp. 189–218, Prentice-Hall, Inc., New York, 1946. Lists such film agencies and sources as colleges, universities, state departments, federal departments, and commercial concerns.

Heimers, Lili, *Health Education for All Ages*, New Jersey State Teachers College, Upper Montclair, New Jersey, 1944. A mimeographed sourcebook of films and other visual aids on the subject of health and related subjects.

Mannino, Philip, *A B C'S of Visual Aids and Projectionist's Manual*, pp. 72–89, M. O. Publishers, Box 406, State College, Pa., 1948. List of 146 producer-distributor sources.

A National Directory of Safety Films, The National Safety Council,

Inc., 20 N. Wacker Drive, Chicago 6, Ill. An annual directory of films and slides concerned with safety, first aid, and fire prevention.

One Thousand and One, the Blue Book of Non-Theatrical Films, The Educational Screen, Inc., 64 E. Lake Street, Chicago 1, Ill. A listing of several thousand films under classified headings.

Selected Educational Motion Pictures, A Descriptive Encyclopedia, American Council on Education, 744 Jackson Place, Washington, D. C. Gives detailed information and evaluations on some 500 instructional films produced before 1942.

Sixteen Millimetre Films, National Film Society, 172 Wellington Street, Ottawa, Canada. A good source for Canadian films.

Sports, Physical Education and Recreation Film Guide, 1947–48 Edition, Business Screen Magazine, 812 N. Dearborn Street, Chicago, Ill. An extensive listing of films and filmstrips.

United Nations in Films, United Nations Information Office, 535 Fifth Avenue, New York 17, N. Y. A valuable source of current films produced by the United Nations.

United States Government Motion Pictures and Filmstrips, available from U. S. Office of Education, Washington, D. C., or Castle Films, 445 Park Avenue, New York 29, N. Y. Castle Films is the contractual agency for the sale of U. S. Government produced films. Rentals may be obtained from college and university film libraries.

A collection of magazines and news bulletins devoted exclusively to audio-visual education.

PCW FILM SERVICE



Note: Rentals of films and filmstrips are available from college and university film libraries. Locate addresses in the sources listed above, or write your state department of public instruction about libraries in your state.

Producers and Commercial Distributors. There are scores of 16-mm. film producers and commerical distributors in the United States who are listed in the bibliography of film sources above.

Magazines and Journals. Mannino's *Manual* lists seven magazines of national scope which are devoted exclusively to audio-visual aids. There are at least two others. In addition nearly every national, state, and local educational journal carries articles and lists sources of audio-visual aids. Most of the distributing libraries publish newsletters and bulletins concerning specific aids and evaluations.

Public Book Libraries. Many public libraries have comprehensive information about audio-visual aids, and a few have small lending departments for films and slides.

National Education Association. Numerous publications, researches, lists, and other data are available through the N. E. A.

Other Organizations. Religious boards, museums, unions, service clubs, and other groups either publish audio-visual bulletins intermittently, or devote space in their journals to news of this type.

Foreign Governments. Many foreign governments foster active film distribution in the United States. Some of these governments publish catalogs, bulletins, or magazines. Three of the most active are the British, Canadian, and Swedish.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. List the advantages and limitations of motion pictures over other types of audio-visual learning aids.
2. What standards should govern policy relative to purchase versus rental of films? Use your own school district as an example. Keep in mind enrollment, number of teachers, curriculum, and budget conditions.
3. Compile what you would consider an adequate library of books, bulletins, study guides, and magazines, for a school of twenty teachers. Assume that the school now has no library materials, but is anxious to institute a good audio-visual program.

4. Much research has been done on the values of motion pictures in education. List at least a half-dozen good research references for such fields as science, social studies, foreign languages, English, industrial arts, music, nature study, and kindergarten-primary.
5. Make a survey of (a) amount of audio-visual equipment in a particular school or building, (b) the number of silent and sound film projectors in your county, and (c) the number of reels of film owned by the schools in your county.
6. If motion pictures were educational at the time of their invention, how and why have educational agencies got so far away from them today?
7. Using the film categories discussed under types of films, discuss utilization of these types in an elementary or secondary school curriculum.
8. Review the arguments for and against sponsored films. What position do you take? Can any analogies be drawn from the areas of textbooks and radio?
9. Within the range of your county or state, list as many of the school-produced films as you can. If you have seen any of them, comment.

LABORATORY EXERCISES

1. Prepare a film lesson for a particular grade or class. Correlate other audio-visual aids with the lesson insofar as possible. Present the lesson before your education class. Hold an evaluation critique.
2. Take three reels of film (any classroom films). Screen. Prepare a utilization chart which will show specifically where the film can be used as to units of study, age or grade level.
3. Screen at least one film of each of the eleven types discussed in the chapter. Evaluate these types for usefulness in the general education program.
4. Write a scenario suitable for use in making a simple school film.
5. If a camera is available, produce a short film in connection with the work of this class.

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Chapter 10

THE MOTION PICTURE (CONTINUED)

THE FORMATION OF TASTES

Some years ago arrangements were made in a certain city through the Warner Brothers Corporation for a Saturday morning showing of some "shorts" for junior and senior high school students. Announcements were made in the schools, and the showing was held in one of the regular theatres. Ten cents admission was charged. Four short films were shown: *The Man Without a Country, Louisiana Purchase, Abraham Lincoln,* and a cartoon. Those in charge of arrangements expected a sellout, but as a matter of fact only thirty or forty children attended. As they left the theatre, evidently much disappointed, one boy was heard to remark, "We got rooked. I'll bet the P. T. A. started this."

Why was this experiment a fiasco? The pictures are excellent historical "shorts" in color, and are pictures which should thrill every American. The answer is probably this: when boys and girls go to the commercial movie house they expect and want to be amused and entertained with

cartoons, saccharine romances, and blood-curdling adventures. The story is an old one. Clubs and organizations plead with Hollywood for decent first-class pictures. Hollywood hurls back the answer, "The public won't patronize such pictures. We lose money on these pictures. We'll make such pictures, when, and if, the public will patronize them." Of course there have been exceptions to this generalization, and the clubs can point to this or that picture and say, "We are right, too; the public will support good pictures, if artistically and sensibly produced."

Why Motion-Picture Appreciation? Are the motion-picture tastes of the American people any concern of the schools? There are those who will argue pro and those who will argue con. Perhaps the best approach to the problem can be made by asking, what are the schools for anyway? The commonest response is, "To teach children." But, to teach them what? "History, mathematics, science, and other subjects," comes the answer. True, but is it enough to teach formal subjects, more or less sterilized, to boys and girls who will soon be the voters, taxpayers, and wage earners of the country? Educators are pretty well agreed that the aims of education must be more inclusive, comprehensive, and utilitarian than were the vague generalities of the past which placed emphasis upon a cold-storage learning of facts about decadent civilizations, all in the name of culture. Culture has been re-defined, educational goals examined, and new methods and new contents organized. Not all of the older goals have been found wanting in this new evaluation, but certainly many new goals are being accepted into the modern educational philosophy.

Professor Dewey has long been hammering the idea home that the school is life. Realities are replacing educational abstractions. Education is coming to grips with the living stuff of life. Nearly two decades ago Thomas Briggs declared that the aim of education is to teach boys and girls to do in a better way the desirable things which they are going to do anyway. Much of what these boys and girls are going to do lies outside the school, hence the need to view everything about us as proper content and area for study. Classes visit newspaper plants, courts, housing projects or hydro-electric dams, for the purpose of studying processes, institutions, occupations, and other content firsthand. This is *real* experience in *real* settings.

Few maintain that learning is limited to the four walls of the classroom. Education, to be effective, must jettison the idea that growth and edu-

cational welfare are limited to organized schools which open at nine o'clock in the morning, close at four in the afternoon, and cease their annual activities with Commencement. Education is broader than schools. All the educational forces of society need to be mobilized in the interests of the learner. Environment influences behavior. After the home, the school is probably the greatest environmental conditioner. It is certainly the business of the school to exert the greatest possible positive influence on the lives of students.

The Motion Picture as an Environmental Factor. It is estimated that 85,000,000 persons in the United States pay admissions weekly to some 15,000 so-called motion-picture palaces. The world attendance is about another 150,000,000. It is further estimated that between a fourth and a third of each audience is made up of youths under twenty years of age. Of these minors about one third are under the age of fourteen. In the state of Pennsylvania alone, there is a weekly movie attendance of more than 7,000,000, of which roughly there are 2,500,000 minors; 1,000,000 thirteen years of age and less, and 206,000 of seven years of age or less. The popularity of the movie as an amusement increases its influence as an educational factor. Motion pictures deal with human beings and their interactions as they live, work, and play. Film plots in multitudinous

Still from *The Safest Way*. Here education comes to grips with real-life situations.

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ways deal with social usages, manners, customs, and life-problems of people. As they deal with these factors, they are likely to build up stereotyped patterns of behavior.

If it is granted that the movies act as a lodestone, what does youth see? They see pictures with themes which have usually been made for adults between the ages of twenty-one and fifty. They get the run-of-the-mill, and the run-of-the-mill is none too good. Educators maintain that only about one third of the movies produced is suitable for family entertainment, yet this author believes this fraction to be much too low. The content of the films of today is much improved over that of the twenties and thirties.

The Payne Fund Studies. In the early thirties a series of studies was conducted by educators and psychologists in several universities of the effects of the commercial motion picture on the learning, social attitudes, conduct, emotional responses, moral inclinations, sleep, and general bodily health of children. These studies startled the country, because they showed, in the main, many deleterious effects of the motion pictures. Since these studies have played so large a part in motion picture discussion both in educational circles and in Hollywood, they will be briefly reviewed. All of the studies were under the general direction of Professor W. W. Charters, who summarized all the investigations.[1] Obviously so searching a project was far-reaching in its results and implications. Very briefly some of the findings of these studies were: (1) Large numbers of children attend the movies. (2) Many of the productions are based on unwholesome themes. (3) Children see and retain about as much from a motion picture as adults. (4) Forgetting from motion picture learning is slower than from other learning media—"the slow drop of the curve of forgetting is striking." (5) Attitudes as well as information are related to

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[1]The individual studies and summary are: W. S. Dysinger and C. A. Ruckmick, *Emotional Responses of Children to the Motion Picture Situation;* P. W. Holaday and G. D. Stoddard, *Getting Ideas from the Movies;* Ruth C. Peterson and L. L. Thurstone, *Motion Pictures and Social Attitudes of Children;* Herbert Blumer, *Movies and Conduct;* S. Renshaw, V. L. Miller, and Dorothy Marquis, *Children's Sleep;* Edgar Dale, *How to Appreciate Motion Pictures;* F. K. Shuttleworth and M. A. May, *The Social Conduct and Attitudes of Movie Fans;* C. C. Peters, *Motion Pictures and Standards of Morality;* Edgar Dale, *The Content of Motion Pictures;* Edgar Dale, *Children's Attendance at Motion Pictures;* Herbert Blumer and P. M. Hauser, *Movies, Delinquency, and Crime;* P. G. Cressey and F. M. Thrasher, *Boys, Movies, and City Streets;* and W. W. Charters, *Motion Pictures and Youth: A Summary.* All of the studies were published by The Macmillan Company, New York, 1933–1935.

motion-picture attendance—attitudes, biases, prejudices, and anti-social behavior patterns are formed and tend to have lasting influence. Desirable attitudes may also be induced, depending upon the movie theme and treatment; for example, a single showing of a picture favorable to the Chinese resulted in a more favorable attitude toward this race. *Journey's End* and *All Quiet on the Western Front* tended to produce attitudes less favorable toward war. The investigators believed these attitudes would have "substantial permanence." (6) There was a tendency, apparently, for children to accept as valid everything seen on the screen. (7) Recall of things seen varied significantly according to topics and the form and surroundings in which they were set. (8) Effect upon the emotions varied considerably: "scenes of danger, conflict, or tragedy produce the greatest effect . . . . upon children . . . . from six to twelve years old." Love and romantic scenes had little effect upon this age group but had a marked effect upon those of twelve to eighteen years. (9) Movies had a marked influence on the sleep of children. A picture "is about as disturbing to sleep patterns as sitting up till midnight, [and] the influence of some pictures . . . . is as great on some children as drinking two cups of coffee in the evening." (10) There were striking individual differences from one child to another. This last statement has significance because educators must beware of sweeping generalizations; that which is a stimulating experience for one child may have relatively little stimulation for another. This inevitably leads to the conclusion that these researches have only scratched the surface, and that our understanding of the influence of the motion picture on children is still in the frontier days.

The Payne Studies were all done in connection with commercial motion pictures. These studies tend to corroborate the vague ideas of many people, but they should not be accepted without some question. Professor Mortimer J. Adler[2] has raised questions of the validity and the fallacy of attaching too much importance to children's answers to "leading" questions. Raymond Moley,[3] too, feels that some of the investigators displayed a great amount of naïveté in their work, especially in handling moral questions. But, these are the opinions of critics and should be weighed along with the statement of Charters, director of the Studies:

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[2]Adler, Mortimer J., *Art and Prudence,* Longmans, Green and Company, New York, 1937. See especially pp. 273–88.

[3]Moley, Raymond, *Are We Movie-Made?* Vanguard Press, New York, 1938.

> The motion picture, as such, is a patent medium of education. Children even of the early age of eight see half the facts in a picture and remember them for a surprisingly long time. A single exposure to a picture may produce a measurable change in attitude. Emotions are measurably stirred as the scenes of a drama unfold and this excitement may be recorded in deviation from the norm in sleep patterns, by visible gross evidences of bodily movements and by refined internal responses. They constitute patterns of conduct in daydreaming, phantasy, and action. The evidence of their influence is massive and irrefutable.[4]

These studies established the fact that motion pictures have a powerful influence on young people in helping mold their ideas, in influencing their attitudes, and in predisposing their behavior. And, motion pictures leave people with information which is more or less lasting. It may well be that some of the research needs to be checked again with the refined techniques of the social psychologists of today, nevertheless, society cannot afford to take the Payne studies lightly.

It is patently easy and popular to thunder censures against the baleful influence of the motion picture on children, but the motion picture is here to stay and no one would want to abolish it, even if he could. But parents and clubs are clamoring for some sort of direction of this powerful influence. It can be exerted for good if there is some sort of direction. This direction may lie in a control or censorship of the motion picture, or it may take the form of education, that is, enlightened understanding of what this new medium of communication is and what it can do, even to the extent of using the medium to pull itself up by its own bootstraps.

Teaching Motion-Picture Appreciation. It appears, then, that what is needed is direction and guidance of children in the formation of socially acceptable moving-picture tastes. This should be goal number one. Goal number two is to recognize the fact that the photoplay can be a true educational medium for recreation, art appreciation, creative expression, tolerance, and international understanding.

Many people prefer the motion picture to the book. Teachers of literature are beginning to recognize it as a vital means of communicating ideas of how people think, act, live, and work. It is, then, cut from the fabrics of sociology, economics, politics, psychology, psychiatry, philosophy, religion, art, and ethnics. The motion picture touches the work

[4] From Charters, W. W., *Motion Pictures and Youth: A Summary*, p. 60. Copyright 1933 by The Macmillan Company, publishers.

of the health teacher, the social studies teacher, the art teacher, in fact all teachers, but particularly the English teachers. A recognition of this fact has alerted the National Council of Teachers of English to such an extent that the photoplay is given prominent space in the Council's literature.

Recognition of these facts and conditions has led to attempts on the part of many schools to introduce courses in motion-picture appreciation and to form movie clubs in order to (1) make high-school students conscious of the influence of the motion picture upon themselves and the public at large, (2) teach them how to make better selections of movies, and (3) increase enjoyment by teaching them how to see more at the movies. These efforts do not aim at increasing attendance at the cinema, but to educate for a more discriminating and analytical attitude, and to break down the cliché that movie patrons check their intelligence at the box office. Appreciation can be simply defined as enjoyment through understanding.

Pioneers in the movement to deal constructively with the movie problem were Max J. Herzberg, principal of the Weequahic High School in Newark, New Jersey, who introduced the use of study guides in connection with current photoplays of recognized merit in the theatres; National Council of Teachers of English; Edgar Dale of Ohio State University, whose book, *How to Appreciate Motion Pictures* has served as a text for hundreds of classes; and the National Board of Review of Motion Pictures. Space does not permit the specific mention of the many teachers and organizations who have contributed a great deal to the movement.

A definitive experiment in motion-picture appreciation was conducted by a committee of the National Council of Teachers of English under the chairmanship of William Lewin. The Council sought to ascertain if the movie habits of adolescents can be improved significantly through the medium of the usual English class; whether discussions of photoplays can develop more wholesome ideals and attitudes; whether the neighborhood theatre can co-operate constructively with the school so that the sovereignty of public taste can be improved; and whether satisfactory "literature experiences" can be achieved through the cinema. The merits and demerits of censorship were not involved. The experiment was organized around sixty-eight groups of pupils in 31 schools, 28 cities, and 17 states. More than eighteen hundred pupils participated. Control and

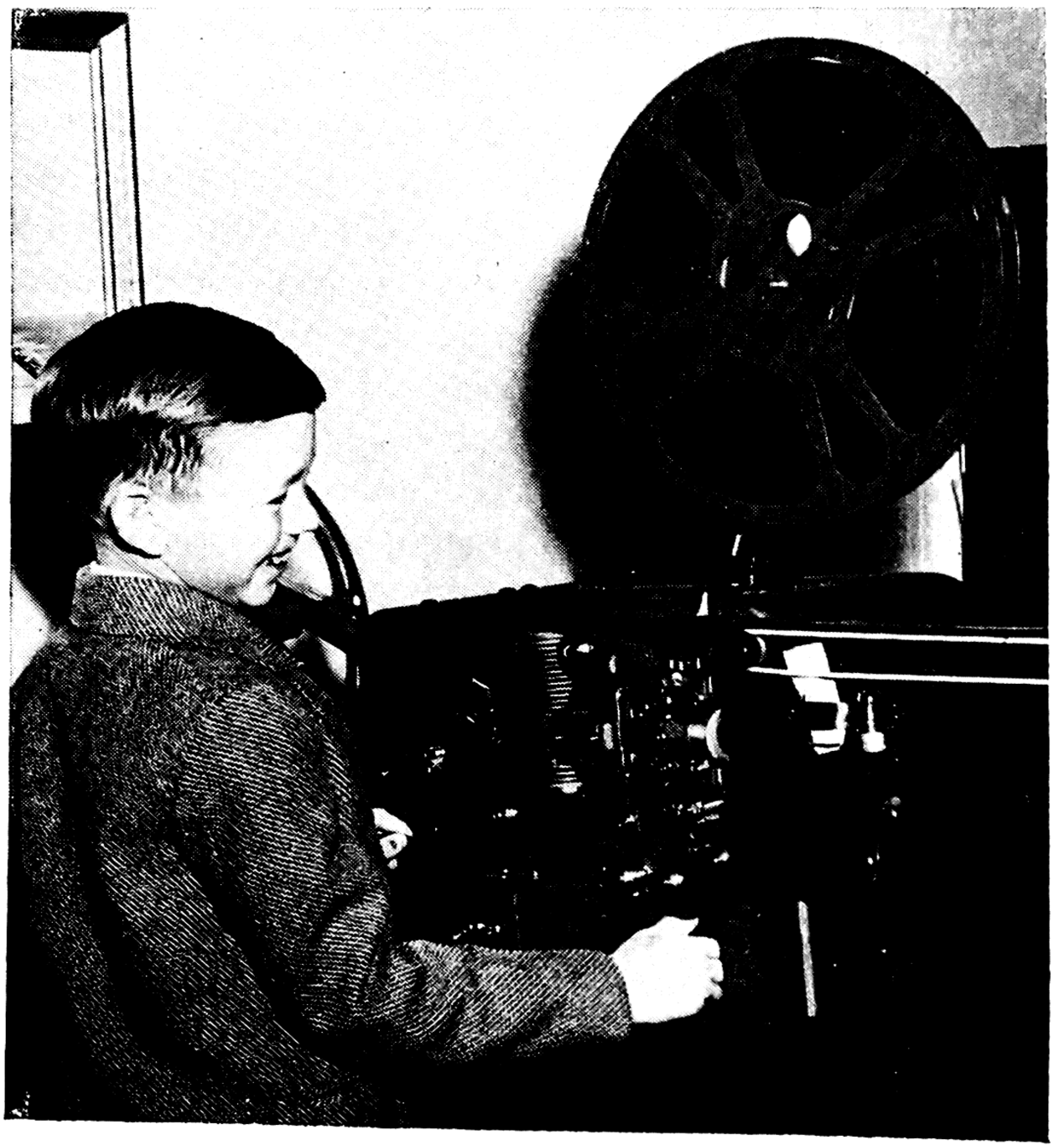
experimental groups were arranged, study guides, worksheets, rating scales, and tests were provided. The experimental groups kept diaries, made scrapbooks and glossaries, read critical reviews, and conducted symposiums and class debates. Criteria for the judging of films and the application of these criteria to the films seen were emphasized.

In the final analysis of results it was found that:

> The experimental groups were superior to the control groups in three ways: (1) in answering the final questionnaire, the experimental groups were 24.3 per cent superior to the control groups; (2) in ranking the photoplays in the final secret ballot, the experimental groups were 41.4 per cent closer to the teachers' criteria, with a correlation of 0.59 as against 0.41 for the control groups; (3) in rating ten pictures by means of the same rating-scales at the end of the experiment, the experimental groups were 52.3 per cent closer to the teachers' ratings, with a correlation of 0.96 as against 0.63 for the control groups.[5]

Hundreds of classes over the United States are now studying the cinema, usually as a part of the English course of study. The second

[5]Lewin, William, *Photoplay Appreciation in American High Schools*, p. 103, D. Appleton-Century Company, New York, 1934.



Fourth and fifth-grade pupils frequently operate motion-picture projectors efficiently. "Know-how" is an aid to appreciation.

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semester of the junior year appears to be a popular scheduling for this study, but cinema study is found in all grades of the junior and senior high school. It is also found in the upper grades of the elementary school. Extensive course-of-study material dealing with the teaching of motion-picture appreciation has been published by teachers' associations, state departments of education, and school districts.

Motion-picture appreciation or discrimination aims to educate children and youth to choose their recreational motion-picture diet wisely. Selection and evaluation are necessary parts of wise choice. "Shopping for your Movies" is an excellent topic for class discussion in the home room, or in connection with various subject fields. Such a discussion would inevitably lead to consideration of devices by which one directs his movie-going more wisely and evaluates what he sees.

It is generally accepted that the schools have a responsibility to guide and direct the students' use of leisure time. This idea was enunciated back in 1918 with the formulation of the seven *Cardinal Principles of Secondary Education* by the Commission on the Reorganization of Secondary Education, and has exerted profound influence for a quarter of a century. This responsibility reaches into the fields of sports, music, art, dramatics, reading, radio listening, and movie attendance.

It should also be noted that motion-picture appreciation should not be confined to selection and evaluation alone. Students should be given an opportunity to understand the social and moral implications of this medium since it affects people from the standpoint of information, emotions, attitudes, and conduct. It is one of the many forces at work in every environment which builds the individual's total behavior pattern, and therefore helps shape national and global patterns.

Approaches to this problem of appreciation are many. Up to this point, emphasis has been placed upon school study as preparation for regular theatre attendance. Throughout the nation many schools and universities are showing limited numbers of feature pictures right in the school. This opens up many opportunities for discussion and evaluation. Communities are interested in a wider use of the school facilities for wholesome recreational activities during out-of-school hours—evenings, week ends, and summer-vacation months. The school codes of nearly all states permit the use of buildings for such purposes. Any school with an educational concept less than this needs to reconsider the goals of education. School playgrounds, swimming pools, and athletic fields are

pretty generally open during the summer. The use of motion pictures for vacation activities is in its infancy, but the possibilities are great.

Motion-Picture Clubs. Many high school clubs are organized around the cinema. Interest is keen and participation so lively that most schools have to set limitations upon the number of members permitted in these clubs. In the New York City high schools the clubs limit their membership by giving tests to applicants. Some of these tests are so rigid and technical that many teachers would have difficulty gaining admission. The work of the motion-picture club has been carefully described in various books and journals for the National Council of Teachers of English.

Many of the clubs have constitutions and bylaws, officers, committees, and regular meetings with overflowing agenda. Perhaps all of them have faculty sponsors. Discussions, symposiums, trips, contests, scrapbooks, and picture collections, and even the writing of scenarios and the making of moving pictures in the school account for the work of most of the clubs. Faculty sponsors indicate that the movie club generates interest in books. Reading is encouraged and the experience of many clubs has been that the members use better discrimination both in the selection of movies to see and books to read.

The purposes of such a club should be set forth rather specifically so that it does not become a gossip club, or that its members do not fritter their time away in meaningless and useless activity. An example of the purposes of a club may be simply stated as:

1. To interest the members of the club in better motion pictures by:
   a. Studying motion picture technique in such matters as directing, acting, photography, setting, lighting, improvisations, sound, casting, and advertising
   b. Learning something about pictures before seeing them
   c. Evaluating and discussing after seeing
2. To establish standards of taste in judging photography
3. To help acquaint the entire student body with forthcoming pictures
4. To work with the librarian in arranging bulletin-board exhibits, and even in the selection of books and magazines with bearing on motion pictures
5. To help plan assembly programs



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Discrimination in choices is being developed in a college classroom.

6. To co-operate with Parent-Teacher Associations and other groups in planning programs
7. To assist in directing study groups of nonmembers who are interested in the cinema
8. To be responsible for projecting films in the school
9. To co-operate with the teachers in the various departments in locating satisfactory films
10. To encourage the production of amateur motion pictures
11. To take pictures of school activities
12. To provide reviews of motion pictures for the school publications and probably for the town paper as well

Teacher Preparation for Directing Motion-Picture Appreciation. Questions concerning teachers who should attempt this motion-picture guidance, amount of preparation needed, and places where preparation can be had, are certain to arise. The fact is that any teacher who is sympathetic toward the cinema problem and who is willing to learn is a satisfactory person to sponsor this work. Sponsors should above all else avoid a condescending attitude toward the cinema. Frequent attendance at a variety of photoplays, attention to critical reviews, and an effort to

keep informed concerning pictures that are being produced are essential. One teachers' manual suggests that the sponsor list pictures seen on cards and jot down pertinent points so that more adequate recall will be possible. Little reference material in the form of books is available, but there is much current material in journals and bulletins. A few colleges and universities have begun to offer teacher-training courses in this field.

Soundings have been taken recently of colleges and teacher-education institutions to see if officials are aware of the place of appreciation in the education of teachers. Most officials state that the pre-service preparation of teachers should include radio and motion-picture appreciation. In spite of the recognition of the value of these subjects, few institutions have organized courses in this area. A survey of courses offered in summer sessions by colleges and universities showed that although 186 courses were being offered in 136 colleges in 38 states, not a single course was devoted exclusively to appreciation. It is reasonable to assume, however, that some attention will be devoted to appreciation in many other courses. There is also an increasing number of workshops being devoted to audio-visual aids, and these will in all likelihood devote some time to radio and motion-picture appreciation.

Other Considerations. Some public schools have been reluctant to introduce motion-picture appreciation, fearing that it would necessitate additions to the teaching staff. Staff additions should not be necessary. A reorganization of courses of study and unit materials will make it possible to include work in appreciation. Intelligent, sympathetic, and alert teachers can rather easily put themselves in a position to handle such appreciation courses, but it should be kept in mind that enjoyment can be desiccated by too much intellectualizing.

Motion-picture appreciation can be taught satisfactorily; in fact, is being taught. By design or by chance, it is generally tethered to the English course. The social studies, too, are replete with opportunities for using the current film. Problems concerning history, geography, civics, economics, sociology, and psychology are available in many of the films which the students see today. They are eager to discuss these materials in their classes.

Appreciation has two meanings. One is intellectual understanding and the other is emotional disposition. In the one instance a person may say,

"I appreciate the difficulties of the motion-picture director" or, "I appreciate the technical quality of that film"; in the other he may say, "I appreciate symphonic music" or, "I appreciate Greek tragedy." As a form of dramatic art, the motion picture is interested in both content and esthetics. It combines the two meanings of appreciation.

The motion picture has been described as the art form of the masses. To some it is plebeian, without tradition and literary dignity. But it is a vehicle of expression and creation along with the stage, the plastic and graphic arts, and music. Its theme is life. Such art qualities as composition, rhythmic pattern, color, and the dramatic use of shading are found in abundance in the cinema. The productions of *Hamlet* and *Henry V* are artistic masterpieces. In addition to the art of setting, lighting, and photography, there are other art forms found in acting, directing, and plot. These may be the art forms of the masses, but they are dynamic. They interest youth.

Measuring the Effects of Teaching Motion-Picture Appreciation. Even a casual acquaintance with the problem of teaching motion-picture appreciation is sufficient to show the difficulties to be encountered when attempts are made to measure appreciation.

One method of appraisal is to note in subjective fashion whether the students evidence (1) a progressive improvement in the selection of motion pictures actually attended, (2) an increased ability to discuss with discernment such matters as directing, camera work, lighting, acting, and originality of plot, and (3) enthusiasm for better photoplays. Another approach is to have students rate the movies they have seen on a simple rating scale by checking values as of 0 to 10, with 0 standing for the poorest movie seen and 10 as the best. The form of such a rating scale might resemble the following:

		Worst I Have Ever Seen					Average or Fair					Best I Have Ever Seen
Title of Movie Seen	Date	0	1	2	3	4	5	6	7	8	9	10
1												
2												

Another method that has been suggested is that of a paired comparison of two photoplays. In this case the student indicates which of two movies he prefers. A number of extensions and refinements of this technique are possible, for example:

Directions: A number of statements concerning motion pictures are given below. Indicate your personal preference by writing the appropriate figures in the columns at the right, as indicated:

Pictures to be rated:

A — title ____________

B — title ____________

	A	B
If you agree with Picture A and disagree with Picture B, write 3 in the first column and 0 in the second column, thus	3	0
If you agree with B; disagree with A, thus	0	3
If you have a slight preference for A over B, thus	2	1
If you have a slight preference for B over A, thus	1	2
Now, rate the following statements:		
1. The picture is artistic		
2. Technical qualities are of a high order		
3. The social value is commendable		
Etc., etc.		

A third technique is to use an adaptation of the man-to-man rating scale such as psychologists often employ in rating personnel. This device was developed in 1918 and was used extensively in rating a large number of United States Army officers. Comparisons are rendered more definite by placing names of men known to the rater in blanks on a key sheet to represent levels of ability. Each person to be rated is then compared to this standard and assigned a numerical score. By substituting names of movies for men, and picture values for levels of ability, the rater is in a position to make a fairly accurate rating of movie-to-movie.

The writer has obtained some interesting opinions of teachers toward motion-picture appreciation courses by using a series of questions developed by Ohio State University. The figures in parentheses on the

blank indicate the replies of 154 teachers (chiefly pre-service) in three audio-visual education courses to the various statements:

MOTION-PICTURE APPRECIATION STUDY

Bureau of Educational Research, Ohio State University

Opinions About the Teaching of Motion-Picture Appreciation

Directions—Should Motion-Picture Appreciation be taught in the schools? We want to know your attitude on this question. Here is a list of statements representing various opinions on this topic. Read each statement and then place a check mark after the statement to indicate your own opinion. Since these statements are only opinions each statement is *not* to be marked as true or false, but you are to express your own opinion about it. If you agree with the opinion expressed by the statement, place a check mark in the column under "Agree"; if you disagree with the statement, place a check mark under "Disagree"; if you are uncertain about your opinion, place a check mark under "Uncertain." Do *each* statement this way.

	Agree	Dis- agree	Un- certain
1. Present standards of appreciation are so firmly fixed in the minds of high-school pupils that it will be impossible to improve them by any kind of teaching.	(0)	(150)	(4)
2. The most important thing that teachers can do is to help improve high-school students' tastes for better motion pictures.	(24)	(65)	(65)
3. High-school teachers of English cannot satisfactorily handle courses in motion-picture appreciation since they are not familiar with current films and do not understand the principles of motion-picture appreciation.	(40)	(88)	(26)
4. It is useless to develop worth-while standards of motion-picture appreciation because the producers will not make pictures which will satisfy these standards.	(0)	(154)	(0)
5. Every child ought to be required to spend some time in his high-school course studying standards which will help him to choose better movies.	(154)	(0)	(0)
6. Children should be taught more about the movies so that they can select the better movies.	(154)	(0)	(0)

(Continued next page)

	Agree	Disagree	Uncertain
7. The value of a course in motion-picture appreciation remains to be seen.	(50)	(71)	(33)
8. Even though high-school students continue to attend the kind of movies which they now see, a course in motion-picture appreciation will change the meaning of these pictures for the students.	(154)	(0)	(0)
9. The problem of tastes in motion pictures is so intimate and personal that no teacher has the right to intrude in this field.	(0)	(154)	(0)
10. Teaching motion-picture appreciation will increase the demand for better movies and ultimately raise the quality of the movies produced.	(142)	(1)	(11)
11. Teaching motion-picture appreciation may not be able to do much, but it can at least make people critical of the present movies.	(152)	(2)	(0)
12. Motion-picture appreciation is just another one of those fads that they are trying to put into the schools.	(1)	(153)	(0)
13. High-school courses ought to deal more with such powerful social instruments as the motion picture.	(149)	(0)	(5)
14. High-school teachers should be permitted to teach motion-picture appreciation if they wish to.	(154)	(0)	(0)
15. The high-school student is so limited in his ability to choose motion pictures due both to parental regulations and to few opportunities to see good pictures that it is pointless to train him to select better movies.	(0)	(145)	(9)
16. Children spend too much money on movies now, so why encourage them to go to more movies by having them study motion-picture appreciation.	(0)	(151)	(3)
17. It is more important to improve the tastes of high-school students for better motion pictures than to teach so much grammar or composition.	(39)	(30)	(85)
18. Teaching motion-picture appreciation will only make children more interested in seeing the			

(Continued next page)

	Agree	Disagree	Uncertain
movies and hence expose them more to the terrible movies of today.	(0)	(154)	(0)
19. Teaching motion-picture appreciation will make children more immune to intense excitement when seeing the movies.	(44)	(55)	(55)
20. There are so many poor pictures today that the school should certainly do something to improve children's tastes in motion pictures.	(154)	(0)	(0)

No one maintains that the cinema is a panacea for everything. It furnishes amusement and it instructs. Carl Milliken, formerly Secretary of the Motion Picture Producers and Distributors of America, in an address before the National Education Association, made a startling statement when he said:

> Why not training in appreciation of motion pictures, the leisure pursuit of the millions. . . . For every man and woman who reads a good book a week, a hundred go to the motion picture theatre. For every one who goes to a concert or an opera, 10,000 go to the movies. For every one who has access to good paintings and good sculpture, probably 100,000 go to the movies.[6]

A Chinese proverb states that whether a civilization will live or die depends upon the way it spends its leisure. The motion picture as a medium for leisure can be improved by raising the standards of taste of audiences and thereby improving the art itself. Censorship is a doubtful approach to improvement. Education offers a constructive channel.

THE FORMATION OF ATTITUDES

Motion pictures can do a significant educational job in such matters as motivation, furnishing information, and assisting in building clearer and more comprehensive concepts. There is some question about the effectiveness of this medium in the formation of attitudes or in supplying the integrative cement which rounds out the individual's educational stature. Controlled experiments in this latter area have been too few and too poorly organized to provide any convincing objective data. Of general opinions, there are many and they point preponderantly to effectiveness of the film in helping to mold attitudes in such emotional-intellectual

[6]Milliken, Carl, "How the Movies Will Affect Life," *Proceedings of the Sixty-Ninth Annual Meeting*, National Education Association, Washington, 1931, p. 73.

areas as racial-religious tolerance, international viewpoints, and social and economic sensitivity and understanding. Hoban maintains that attitudes are developed in three ways: (1) out of a person's social milieu, (2) from severe emotional experiences, and (3) on the basis of critical examination of accumulated experiences.[7] In other words, attitudes are formed from one's environment, specific strong emotional experiences (accidental or otherwise), and one's formal educational experiences. Actually all of these conditions are environmental, but when broken down into specifics, attitudes toward war, for example, are formed by (1) what the community in which one lives thinks, (2) being caught up in the meshes of war by actually being of draft age during war years, and (3) the specific influence of teachers and books on the individual. The first and third of these conditions are then the prerogatives of the school, because they dovetail into a unity with the modern educational philosophy of extending the scope and responsibility of the school beyond the bounds of the classroom.

Racial Attitudes. The Payne Fund Studies brought out the fact that the attitudes of high-school boys and girls can be changed by means of motion pictures, as has been done in the case of attitudes toward the Negro and the Chinese. It should also be remembered that instead of conditioning desirable changes, there have been instances of the film merely serving to reinforce already existing prejudices.

Why is it that American children generally hold Dutch children in such high regard? On the other hand, why is it that certain races and certain nationalities are held in low esteem? Racial, national, and international attitudes are formed from a complex maze of conditioning factors of the environment, only one of which is the motion picture. But, let the motion picture constantly portray a particular race as idle and slovenly, and the public, aside from other influential factors, is predisposed to regard him accordingly. American school children read in nearly every grade delightful stories of Holland, of the courageous, peace-loving people and a landscape dotted with dikes and windmills. Political relations between the United States and Holland have been amicable, and the motion pictures have presented Holland's cultural features at their best. Americans consequently regard the Hollanders highly.

[7]Hoban, Charles F., Jr., *Focus on Learning*, pp. 95–96, American Council on Education, Washington, D. C., 1942.

Orientals have, in the main, suffered much from an unfavorable portrayal in the movies. Thus, society is faced with being in the ridiculous position of spending millions of dollars to impart facts to students, only to find strong emotional biases neutralizing the knowledges being taught. Some time and thought should be given to the problem of conditioning reactions. Factual giants and emotional juveniles are too common for comfort.

But, the problem for the moment is interracial understanding based on domestic justice. Can the film further a tolerant point of view, and is it reasonable to hope that boys and girls of majority groups may eventually take just pride in having racial mixtures as a part of America's population? This is a task which books, treatises, pamphlets, speeches, conferences, and clubs, have failed to do. What evidence there is at hand tends to indicate that motion pictures, if properly handled, will cope with the problem more successfully. Films can deal sympathetically with the racial problem. *The Story of Dr. Carver, Make Way for Youth, Mexican Children, Chinese Children,* and *The Brotherhood of Man* are examples of the type of films needed. Courses are currently being organized in elementary and secondary schools in "Inter-Group Cultures." Such courses provide wonderful opportunities for the integration of radio, motion pictures, and books into a successful attitude-forming course based on broad concepts.

But if schools wish truly to promote interracial understanding and democracy between peoples in a community, they must influence more than the student body. Of course, the influence exerted on the students will be carried home, but this process of community education is too slow, and is not always strong enough to combat contrary attitudes already held by the community. Powerful programs are needed to mobilize community thinking on serious problems. A frontal attack must be made on the total environment if behavior patterns are to be changed. Any one, or two, or a few motion pictures are not enough. It will take many films, good, well-planned films, co-ordinated into a larger program. At least one Hollywood producer and one actor of national note have become interested in the problem and are doing something about it, but the tides of intolerance are too strong for feeble unrelated efforts.

Persons interested in the community's endeavor to use factual films for purposes of enlightenment should be alert to certain local problems. Otherwise, theatres will not necessarily show factual films if they are

produced. During time of war, theatre owners march along with the community splendidly, but in peace time they are wont to call the steps and the cadence. At this particular moment famine faces the world. Many agencies and organizations are active in trying to mobilize an all-out effort to send food to starving lands. Three splendid motion pictures—*Seeds of Destiny, The Pale Horseman,* and *Don't Be a Sucker*—have been produced and released to help develop the public march. These films are not being shown by the theatre owners who apparently wish to give the public anemic tidbits instead. Actually only the first two of the above films deal with food, "the plasma of peace." *Don't Be a Sucker* is a dramatic appeal for racial and religious tolerance. It is up to the public to insist that the commercial theatres show such films as these after they have been made. The nontheatrical libraries are doing their best to reach the public with such film fare, but it is the commercial screen after all that gets the millions of people who probably need the lessons most.

International Attitudes. During the war America used every dollar, every effort, and every technique at her command in order to fight successfully. The Armed Services trained millions of young men in record time. Now, someone has raised the question, "Shall we educate our children as well as we trained our servicemen?" Democracy and world-mindedness are not won merely on battlefields. They are concepts and attitudes which can be taught in the schools, and should be taught continuously from kindergarten upward.

If peace is to be lasting and if people over the world are to work together harmoniously, there must be trust and understanding. The motion picture is undoubtedly one of the best means of learning about people throughout the world. The President of the Motion Picture Association of America, Inc., wrote vigorously along these lines in his 1946 report:

> There cannot be one world as long as there are any foreigners in it. The very meaning of the word "foreign" must disappear, and with it the plurality of discordant foreign policies by which the nations are divided. But the peoples of the world will cease to seem strange or foreign to one another only when they know each other as neighbors do. To bring them to such knowledge of one another is a mission which the motion picture is peculiarly fitted to perform.
>
> . . . . Because the moving, talking images on the screen have all the immediacy and vitality of life itself, film spectators all over the world come into each other's presence and live together in the same reality. The com-

munity of film spectators is a symbol of the world community yet to come. Knowing each other through the film, the most widely diverse human groups begin to get the feeling of what it means to be residents of the same planet and members of the same race.

As I see it, the free interchange of ideas is even more important than the free interchange of goods. There must be no obstacles to the transit of media of communication. Men must have free access to the minds and hearts of one another even more than they must have free access to indispensable natural resources.[8]

If the motion picture is the medium of communication with the commonest denominator, then two problems loom ahead: (1) the production and distribution of films with real understanding of all peoples everywhere, and (2) the intelligent utilization of these films as they become available. Already there are a great many films available which measure up to the criterion of "real understanding." Some of them were produced before the war, some during the war, and some since the war. Many of them, because of certain slants, will have to be discarded or re-edited, but the motion picture industry throughout the world knows the value of films for international understanding.

There is every reason to believe that the officials of the United Nations realize the importance of films. Film records comparable to written and printed records are being made of all conferences. These basic film records are released pretty much as press releases so that authenticity and objectivity are guarded. Furthermore, all film footage of the United Nations is being catalogued. At the San Francisco Conference the delegates from the various nations brought films from their respective countries for showing to other delegates, and two theatres were provided for this exclusive purpose. Programs were changed daily and showings ran continuously. Sample programs for four days will show the type of film material presented:

May 1. United States of America War Department Films

Battle of China	60 minutes
Divide and Conquer	60 minutes
Battle of Britain	50 minutes
Battle of Russia	45 minutes
Gracios Amigos	18 minutes

[8] Johnston, Eric, *The Motion Picture on the Threshold of a Decisive Decade*, pp. 7–8, Motion Picture Association of America, Inc., Washington, D. C., 1946.

May 2. Selected Films—British and Australian Governments

The Grassy Shires	14 minutes
Country Town	16 minutes
South Africa	14 minutes
New Zealand	22 minutes
Australia Calling	20 minutes

May 3. French Films Dealing with Liberation

The Next Time We See Paris	12 minutes
The Liberation of Paris	20 minutes
France Regains Her Frontiers	15 minutes
Newsreel Magazine	10 minutes
Inside France	20 minutes

May 4. Films of the Union of Soviet Socialist Republics

From Vistula to Oder	40 minutes
The Battle of Sevastopol	50 minutes

What do the children of other countries think of the United States? To what extent are their attitudes toward the United States formed by motion pictures, regardless of whether the pictures are made in the United States or elsewhere? Years ago while lecturing in England, Heindel[9] made a study of British children's ideas of the United States, and of the source of these ideas. The method used was to present to one thousand children a series of statements with which they were asked to express strong agreement, agreement, disagreement, strong disagreement, or no opinion, or to indicate that they did not understand the statement. The statements and the percentages of children who *strongly agreed* or *agreed* with them are given in Table II, page 272.

The significance of these data is enhanced by a study of the sources from which the adolescents (ages thirteen to sixteen) indicated that they had obtained their information. The first, second, and third sources of information mentioned by each student are shown in the three columns of Table III, page 273.

In the same year, Frank Darvall of the English-Speaking Union of the British Empire wrote:

> American films are the chief British source of interest and knowledge so far as the American people and their history, country, and life are con-

[9]Heindel, Richard H., *American Impact on Great Britain*. Copyright, 1940, by University of Pennsylvania Press.

cerned. Every night of the week tens of thousands of British men, women, and children are seeing American films, ... There is no doubt that these American films, whatever their intrinsic quality, do arouse very great interest in the country which produces them. . . .[10]

The time has come for the production of motion pictures which portray, as accurately as possible, what the American people and American institutions are like. England has made a start in the right direction by preparing a film designed to interpret America understandingly and sympa-

Table II. Ideas of British Children Concerning the United States as of 1937

Statements	*Per Cent Agreeing*
1. American moving pictures give a true picture of American life	70.5
2. British newspapers should print more news about the U. S.	32.1
3. The U. S. should join the League of Nations	91.1
4. The U. S. is more democratic than England	8.7
5. It is easier to acquire wealth in the U. S. than in Great Britain	87.0
6. I want to learn more about the U. S.	54.7
7. I am more interested in the U. S. than in Europe	40.2
8. The union of the English-speaking peoples would safeguard the welfare of the world	61.3
9. Britain has to fear American competition	26.7
10. There is more difference between Scotland and England than between Canada and the U. S.	47.5
11. There are many art museums in the U. S.	8.6
12. The U. S. would join Britain in any future war	83.8
13. England can learn more from Europe than from the U. S.	54.0
14. Americans are boastful	90.2
15. Americans think and act in the same way we do	15.8
16. The Negro is badly treated in the U. S.	91.3
17. Justice is effective in the U. S.	20.9
18. Americans speak very bad English	83.8
19. American-made products never have the quality of British-made products	89.0
20. I can tell when a moving picture comes from America	94.5
21. Great Britain should not have to pay her war debts to the U. S.	69.5
22. Americans are good sportsmen	51.8
23. Americans carry speed to excess	70.7

[10]Darvall, Frank, "The Film as an Agency of British-American Understanding," *The Journal of Educational Sociology*, 2: 129–37, November, 1937.

Table III. Sources of Information

	1	2	3
The cinema	583	360	22
Newspapers	99	110	184
Teachers	46	119	236
American tourists	28	30	26
English travelers	15	14	30
Magazines	29	30	49
School books and school training	70	192	302
American stories, fiction	35	22	39
Speeches	21	24	9
Home training and discussion	25	36	43
Clubs, organizations, societies	5	3	4
Letters, correspondence with the U. S.	3	1	2
Radio	7	12	2
Travel in the U. S.	12	..	..
Imagination	20	24	26

thetically to the British. It is titled simply *The United States,* and is a splendid document for international understanding. Although this film was made by the British for the British, it gives Americans the opportunity to see themselves as others see them.

This film is so important that a review of it is not amiss. The chronicle begins in an English cinema where a Hollywood gangster film is being shown. An English soldier, talking to his girl friend, accepts the film story as an authentic picture of the United States. An American soldier overhears the conversation and is amused and piqued at this seemingly naïve view of America. The soldier recalls his home town in Indiana, the United States as he knows it, and the fact that he never saw a gangster in his life. The picture from that point on is the United States as the American soldier sees it. The film is a compliment to us, and as one reviewer stated, "a double compliment when we realize that the British made it for their own people."

American schools quite generally offer courses in International Relations. Some schools stress inter-Americanism, but others take a global view. These courses offer rich opportunities for stressing understanding and goodwill, and for promoting racial, religious, and political tolerance. Practically every conceivable audio-visual aid can play a prominent part

in such courses. According to Esther L. Berg[11] the New York City schools are implementing international understanding through courses, programs, and units of study based on the United Nations Charter. A new source bulletin, *A Better World,* lists objectives and suggestions for teachers of children at the various levels of understanding. The goals of the program are to help the child to:

1. Develop respect for individual human personality
2. Understand the importance of working together, assisting one another, being considerate of one another
3. Acquire a sense of devotion and responsibility to his class group, his school, his family, his community
4. Comprehend the need of interdependence in group life, community life, national and world affairs
5. Understand that man belongs to a world community
6. Learn that nations, as well as individuals, need one another
7. Respect minority points of view, the rights of others, fair play, justice and tolerance
8. Understand the necessity of real friendship for people of all races, of all religions, and of all nations
9. Realize the importance of economic and social security for all
10. Practice "responsible freedom"

In conclusion, the greatest barriers to understanding of peoples by other peoples have been time, distance, and language. These barriers can be more easily overcome by the motion picture than by any other medium now known. Intelligent public opinion regarding the basic humanity common to all mankind must be cultivated.

Social and Economic Attitudes. The power of the cinema in creating social and economic opinions is extraordinary. Some individuals may believe that slums exist because people are lazy and indifferent, or, as one writer has phrased it, slums are bounded on one side by the marshes of Psychotica and the black holes of Moronia on the other.

A few experiments have been tried in which a film or films were shown several times to a group and the attitudes and reactions of the group

[11]Berg, Esther L., "Visual Aids on United Nations," *Educational Screen,* 25: 22–32, January, 1946.

measured after each showing. Using this procedure, Lloyd Ramseyer[12] showed documentary motion pictures dealing with soil erosion and the Works Progress Administration to fifteen hundred individuals ranging from the seventh grade to adults. Scaled attitude tests were constructed to measure the effect of the films on the experimental groups. Using the WPA film, Ramseyer found that attitude shifts developed which were fifteen times the probable error of the difference of the means, which means that the shift was caused by something more than coincidence. Similar results were obtained by using films on soil erosion, *The Plow that Broke the Plains* and *The River*. Furthermore, "after two months it was found that the attitudes were still significantly different from those originally held."

It is obvious that the motion picture can produce sensitivity to social and economic problems just as it can create better understanding of peoples—their institutions and cultures. Naturally the film has great possibilities as an agency for propaganda. Every totalitarian country knows the value of the film for influencing people. When the Italian army invaded Albania, the radio and the leaflet informed the Albanians of the worthy motives of the conquerors. Be it also noted that almost immediately upon the entry of the Italian soldiers into Tirana, soup kitchens and free movies were set up for the natives. The movies, according to the news dispatches, were Italian newsreels, scenes from the Italian conquest of Ethiopia, and totalitarian culture. But fear of the film as an instrument of propaganda will not stop its impact. It would, however, appear to be better to teach pupils how to detect propaganda in films, and to attempt to develop critical-mindedness in viewers than to try to wish the problem out of existence. Propaganda exists in almost all media of communication. The development of intelligent minds with ability to weigh critically and scientifically—to see hidden motives and false interpretations of facts—is the only solution. Research studies show conclusively that this can be done.

CONCLUSION AND SUMMARY

The motion picture is vastly important as a medium of education for both those in school and out. It should be used as a means of assisting in

[12]Ramseyer, Llcyd L., "Factors Influencing Attitudes and Attitude Changes," *Educational Research Bulletin* (Ohio State University), 18: 9–14, January, 1939.

the educational growth and development of children, and it also should be considered as educational content. Appreciation of the motion picture can be taught just as appreciation of drama, art, and literature is taught. In the main, teachers scarcely envision the motion picture's possibilities in forming attitudes. Since it transcends the barriers of nationality, language, illiteracy, and geography, it can help people all over the world know and understand other peoples of the world. The most forceful elements for mutual understanding are the portrayal of the common elements of humanity and human experience. Maturity in film production is developing nowhere more rapidly or remarkably than in the field of international understanding. It is said that the airplane is remaking the world map. The motion picture is helping remake the attitudes of people.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Discuss the contention that many motion pictures seem to hold "habitual biases" and "special pleadings." Give examples. Does it seem that the producer intentionally is using the film for subtle propaganda?
2. Compare the amount seen and retained from a motion picture by children with that seen and retained by adults.
3. It has been shown that motion pictures influence the physical well-being of children. How? There is general belief that the movies are deleterious in other ways. What are they? Can you cite scientific evidence to corroborate or disprove these general beliefs?
4. Why is the motion picture called a universal language?
5. Discuss the topic, "Movies should have no higher purpose than to provide 'escapist entertainment,' or movies should picture current realities and social issues."
6. Without doubt current motion pictures are giving more attention to content and ideas. So far only causes in which nearly everyone believes have been handled. Is this propaganda? Within what limits should propaganda operate? Can the motion picture handle "untouchable" social problems?
7. To what extent do you think government—federal, state, and city—should enter the motion picture entertainment field?
8. Discuss governmental regulations of films from the standpoint of (a) prohibition, and (b) censorship.
9. A motion picture is made up of plot, acting, directing, dialogue, setting, lighting, photography, sound, and ideas. (a) Arrange a scale and evaluate several feature pictures. (b) To what extent are these the elements of a picture which the public uses in appraising a picture's worth? (c) Can appreciation classes in junior and senior high school use criteria such as these to improve tastes? (d) If you were preparing criteria to be used with an adult education group, what items would you add or subtract?

10. A complete report should be made on the Payne Fund Studies made more than a decade ago. Are they psychologically sound today? Check the doubts cast upon some of their findings by Adler, Moley, and others.
11. List what you consider the unsolved problems in the use of the motion picture for fostering attitudes as to racial and religious tolerance, social and economic understanding, and international relations.
12. Scrutinize the last four or five annual reports of the President of the Motion Picture Association of America, Inc., to see if there are any trends, conclusions, or generalizations to be made.

LABORATORY EXERCISES

1. Screen some of the attitude-forming films mentioned in this chapter. Analyze and criticize.
2. Build a series of workable film bibliographies for:
   a. Teaching religious tolerance
   b. Teaching better racial relations
   c. The goals of the New York City program, *A Better World*
   d. Teaching better international relations with a particular country
3. Screen three or four of the human relations films produced by the Commission on Human Relations under the direction of Dr. Alice Keliher. Critically evaluate these films.
4. Consult the reference in the bibliography to Louis E. Raths. Select a worth-while unit and prepare a guide of co-ordinated audio-visual materials, concomitant human problems and needs, and related experiences.
5. The following films deal with the brotherhood of man. Screen and prepare a report on the effectiveness of such films to change attitudes. How should these films be used, and with what age groups?
   a. *Americans All,* 16-mm., sound, 16 min., March of Time.
   b. *Boundary Lines,* 16-mm., sound, color, 11 min., International Film Foundation.
   c. *Brotherhood of Man,* 16-mm., sound, color, 11 min., Brandon Films.
   d. *Man—One Family,* 16-mm., sound, 17 min., British Information Services.
   e. *The House I Live In,* 16-mm., sound, 10 min., Young America Films, Inc.

   (For rental of these films, consult your nearest rental film library.)

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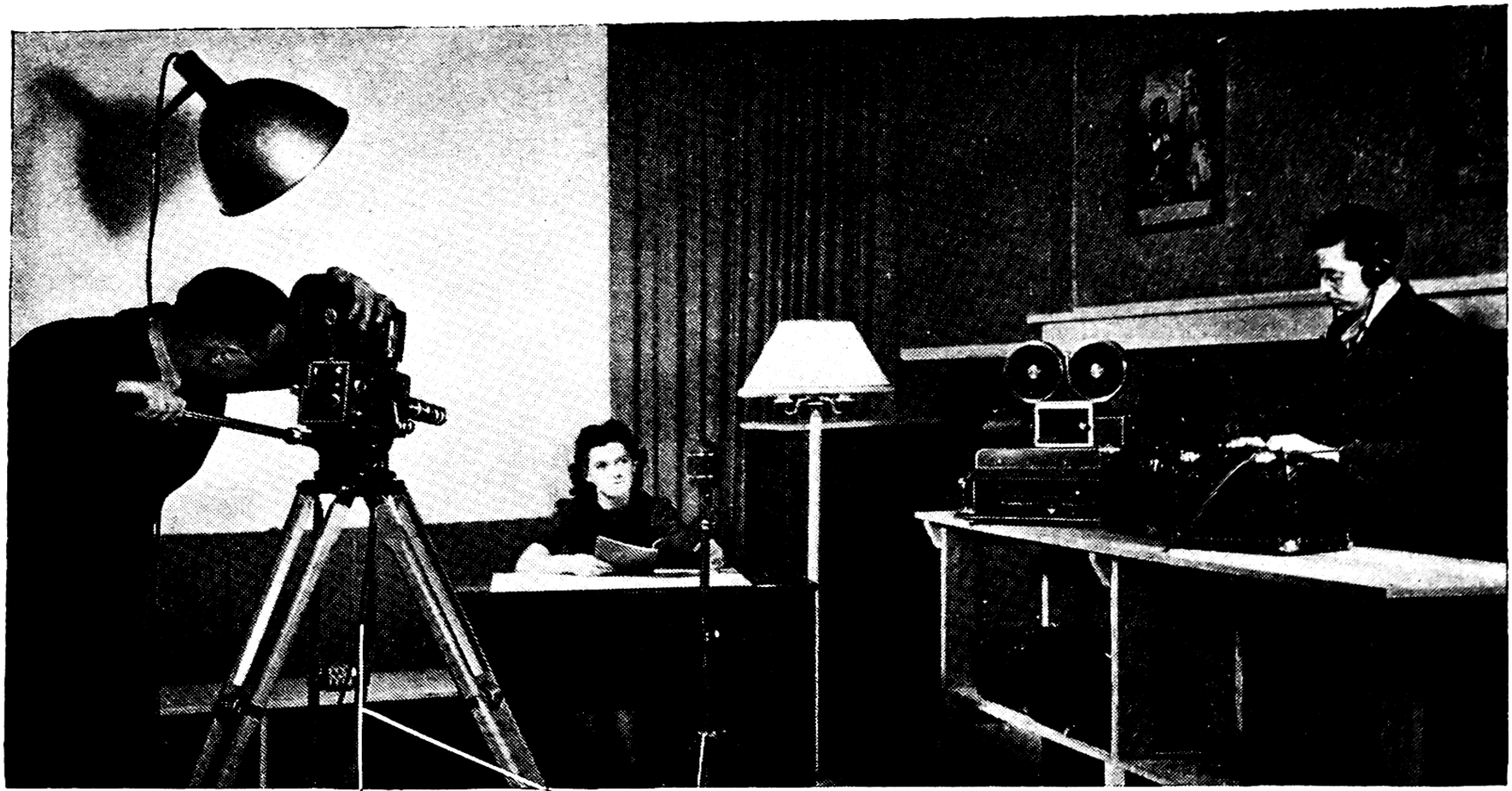
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Chapter 11

PHYSICAL EQUIPMENT FOR MOTION–PICTURE PROJECTION

Craftsmanship depends upon first-class tools kept in prime working order and upon skill and imagination in their use. As the field of audio-visual education approaches greater maturity, a smooth and effective use of the various aids requires that careful consideration be given to the places where they are to be used, to selection of proper equipment, to care of the equipment, and to the efficient training of the personnel who use the equipment. Poorly prepared and presented lessons whether they be in the form of lectures, class discussions, trips, maps, demonstrations, or films cannot possibly achieve effectiveness. It is tragic to see schools purchase expensive equipment only to find that it is not suited to their needs, that the teachers do not understand how to use it, or that it is allowed to deteriorate because of the indifference or ineptitude of those who use it. Although this chapter in no way tries to achieve the objectives of a manual or a handbook, it hopes to sensitize teachers and

administrators to the problems involved in the use of physical equipment concerned with motion-picture projection. These problems will be discussed under the headings of: (1) projection rooms, (2) projectors, (3) films, (4) screens, and (5) picture developments.

All of these problems are practical and vital to every school. A survey[1] of 16-mm. sound equipment, present use, and future needs is available, and since it throws some light on all of these problems, it is well to get its orientation before discussing each problem in detail.

1. Amount of equipment and its age
   a. No. of projectors per school 3⅓
   b. Age
      (1) Less than one year old 21%
      (2) 1–2 years 28%
      (3) 3–4 years 15%
      (4) 5–6 years 16%
      (5) 7–8 years 9%
      (6) 9–10 years 11%

2. Type of use made of the equipment
   a. Auditorium only 5%
   b. Classroom only 20%
   c. Both auditorium and classroom 75%

3. Personnel operating the equipment and hours of training in its use
   a. Students 80%
      Training—1 to 100 hours; average, 10.8 hours
   b. Teachers 50%
      Training—¼ to 3 hours; average, 1.7 hours
   c. Other paid help 5%
      Training—average, 4 hours

4. Most satisfactory operating personnel
   a. Students 80%
   b. Teachers 20%

5. Personnel to move equipment from room to room
   a. Students 65%
   b. Teachers 25%
   c. Janitors 5%
   d. Other paid help 5%

[1] Schreiber, Robert E., "The ABC's of Audio-Visual Equipment," *Educational Screen*, 25: 322, June, 1946.

6. Characteristics insisted upon as ideal equipment
   a. Illumination
      (1) 1000 watts 60%
      (2) 750 watts 30%
      (3) 500 watts, or less 5%
   b. Speeds
      (1) Sound only 20%
      (2) Both silent and sound 80%
      (3) Reverse 20%
      (4) Still projection 20%
   c. Volume
      (1) Auditoriums 80%
      (2) Classrooms 20%
   d. Weight
      (1) 50–75 lbs. 30%
      (2) 25–50 lbs. 50%
      (3) 25 lbs., or less 20%
   e. Other features
      (1) Blimp case 50%
      (2) Microphone attachment 55%
      (3) Motor rewind 80%
      (4) Micrometer tilt 50%
      (5) One case 25%
      (6) Two cases 45%
      (7) Special safety devices 35%

PROJECTION ROOMS

Functional Use of Buildings and Rooms. In the past a school building was a school building, and pupils and educational programs were fitted to the building haphazardly. But today school architects, administrators, and boards of education are giving much thought to the specific uses which a building and its various rooms must serve.

In the not too far-distant future visual education will be looked upon as an indispensable part of the work of every school. The various aids and devices will be so carefully integrated with the educational program that they will cease to be aids and will be considered as a part of the dynamics of education. Such a consideration means that every teacher will be using multiple audio-visual materials constantly. Therefore, every

room in every building must be so arranged structurally that these materials may be used at a moment's notice without going to the trouble of changing a schedule and moving a class to another room.

Two Points of View. In the meantime, practical contemporary problems call for attention. Most of the school buildings now in existence are poorly adapted for maximum use of audio-visual materials. Electrical outlets either do not exist, or are poorly placed in many rooms. Although most classrooms are unilaterally lighted, few of them are equipped with proper shades or draperies for darkening. Ventilation is still another problem. Hard walls, ceilings, and furniture bounce sound about the room and back into the ears of the listeners. Lack of screens, projection stands, and other items handicaps the teacher who wishes to integrate audio-visual aids with her teaching. Consequently, two points of view are much discussed today. One view holds that certain classrooms should be adequately fitted up and set aside for the use of classes using radio, recordings, and reels. Classes then move about with teachers scheduling these special rooms for periods when they wish to use audio-visual materials. The other view holds that the class should remain in its regularly assigned room, and that it should be possible for the teacher to use any audio-visual aid desired without going to a special room. Portable screens and projectors are brought to the room as needed and the class carries on in its assigned room.

There can be no question that optimum educational values accrue when audio-visual materials are used in the regular instructional environment. Costs, however, must be considered. As new buildings are erected, many of these problems can be satisfactorily resolved without undue increase in costs. Another consideration that tends to complicate matters hinges on the fact that school architects are trying to get more light into classrooms and are designing bilateral lighting. The development of a daylight projector will take care of this complication. Daylight projection factors involve greater light power, improved screens, possibly reflecting screen boxes, and even change in the film itself.

Immediate Problems. Since the motion picture is primarily visual, most of the problems of adapting classrooms are concerned with adequate darkening facilities. It should be noted that absolute darkness is not imperative. In fact good ventilation is more important than total darkness. The class that is uncomfortable or falls asleep is not going to profit from

the instruction regardless of its value. Studies conducted by the Society of Motion Picture Engineers show clearly that a "general room light of the order of 1/10 foot-candle is not harmful." This corresponds to a light sufficient to read an ordinary newspaper with difficulty. No light beams should strike the screen nor the walls near the screen, nor be reflected in any way from objects in the room, nor shine in the eyes of the members of the class. The screen should be the brightest object in the room. Opaque shades held in place by hinged or rigid, wooden or metal, guides are entirely adequate, although opaque draperies hung on traverse rods are somewhat better because they provide for better ventilation and facilitate better room acoustics. An air-conditioned room is ideal from the standpoint of ventilation.

Wide classrooms present a viewing problem because those members of the class at the sides will be subjected to a viewing angle which may distort the images on the screen. No member of the class should be nearer than six feet to the screen, nor have a viewing angle of more than thirty degrees. More will be said on this point in connection with screens.

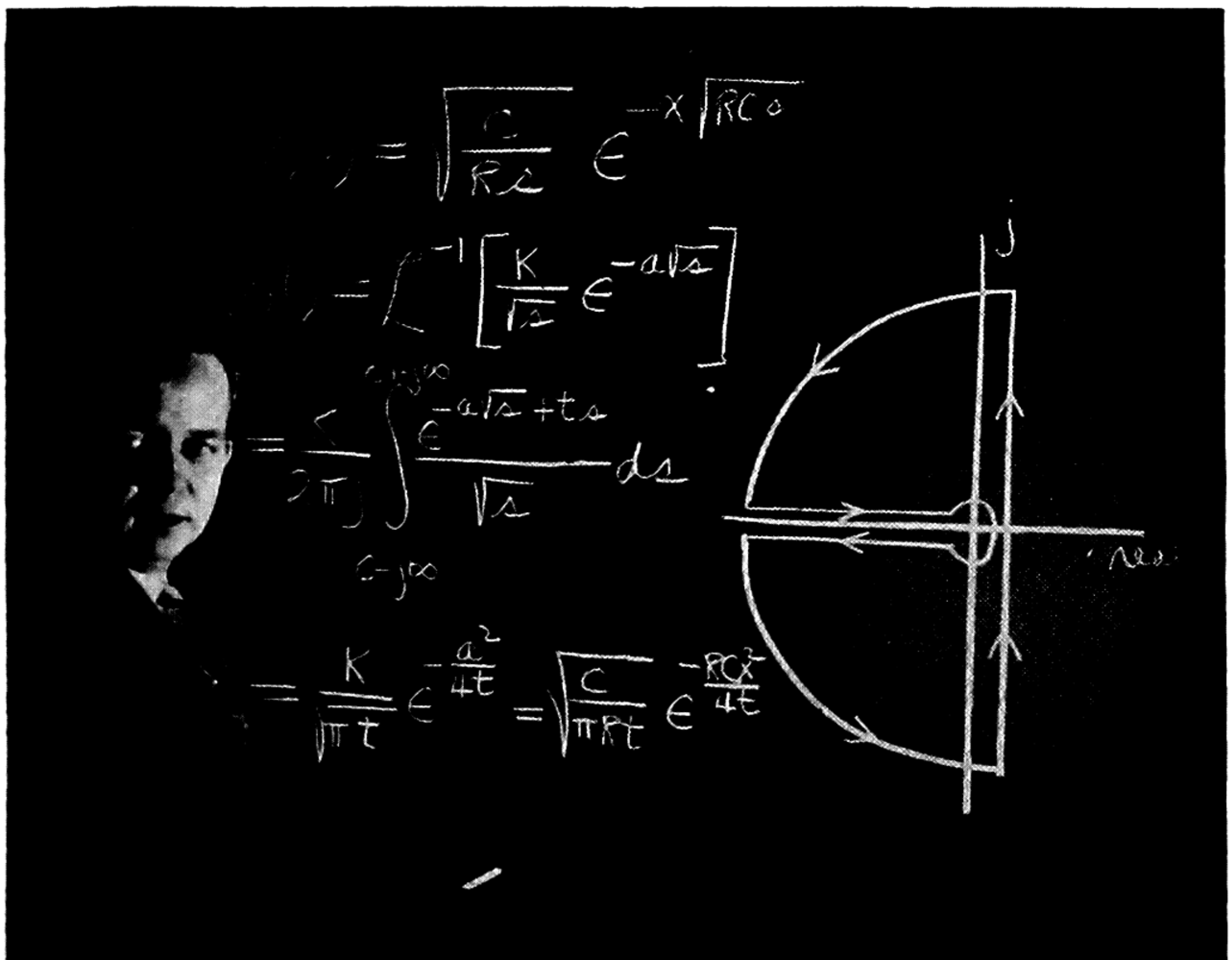


In this darkened classroom tiny spotlights on chair arms enable students to take notes on motion-picture lectures.

BY *Life* PHOTOGRAPHER HERB GEHR, COPYRIGHT *Time* INC.

Long narrow rooms, although preferable to wide rooms from a visual standpoint, have the disadvantage of setting up sound reverberations. Walls and ceiling treated with sound absorbing materials such as acoustical tile or board naturally offset this disadvantage. Draperies on the walls, or even at the windows, help. It is recommended that at least one-third of the walls be draped if the room is finished in hard plaster or wood or has a large amount of blackboard space.

Unless the sound waves meet some soft or porous substance, they are reflected and the effect upon the audience is one of irritation. The voice coming from the projector-speaker builds up to a roar, and continues momentarily after the last word is spoken. The problem is not so pronounced with music. Obviously the acoustics of a room which is filled with people are better than those of an empty room, because the clothing of the people absorbs the sound. Engineers maintain that it is not necessary, or even desirable, to absorb the sound to the point of a "dead" effect. A convenient, desirable criterion is to have a room so equipped that it is easy for two people to converse in ordinary tones from opposite ends of the empty room without blurring or reverberation. Most classrooms actually do not present too many problems acoustically. Auditoriums, of course, must be treated to closer tolerances. Accurate and scientific measurement of the conversion of electrical energy into sound energy is a complex matter. Projectors are equipped with volume and tone controls so that given a moderately desirable room, the sound can be regulated to such an extent that major problems are not too numerous. Speakers with



Flourescent chalk may be used effectively in darkened classroom.

BY *Life* PHOTOGRAPHER HERB GEHR, COPYRIGHT, *Time* INC.

a power output of 5 to 10 electrical watts suffice for classrooms, and 10 to 20 watts are about what is needed for the auditorium.

PROJECTORS

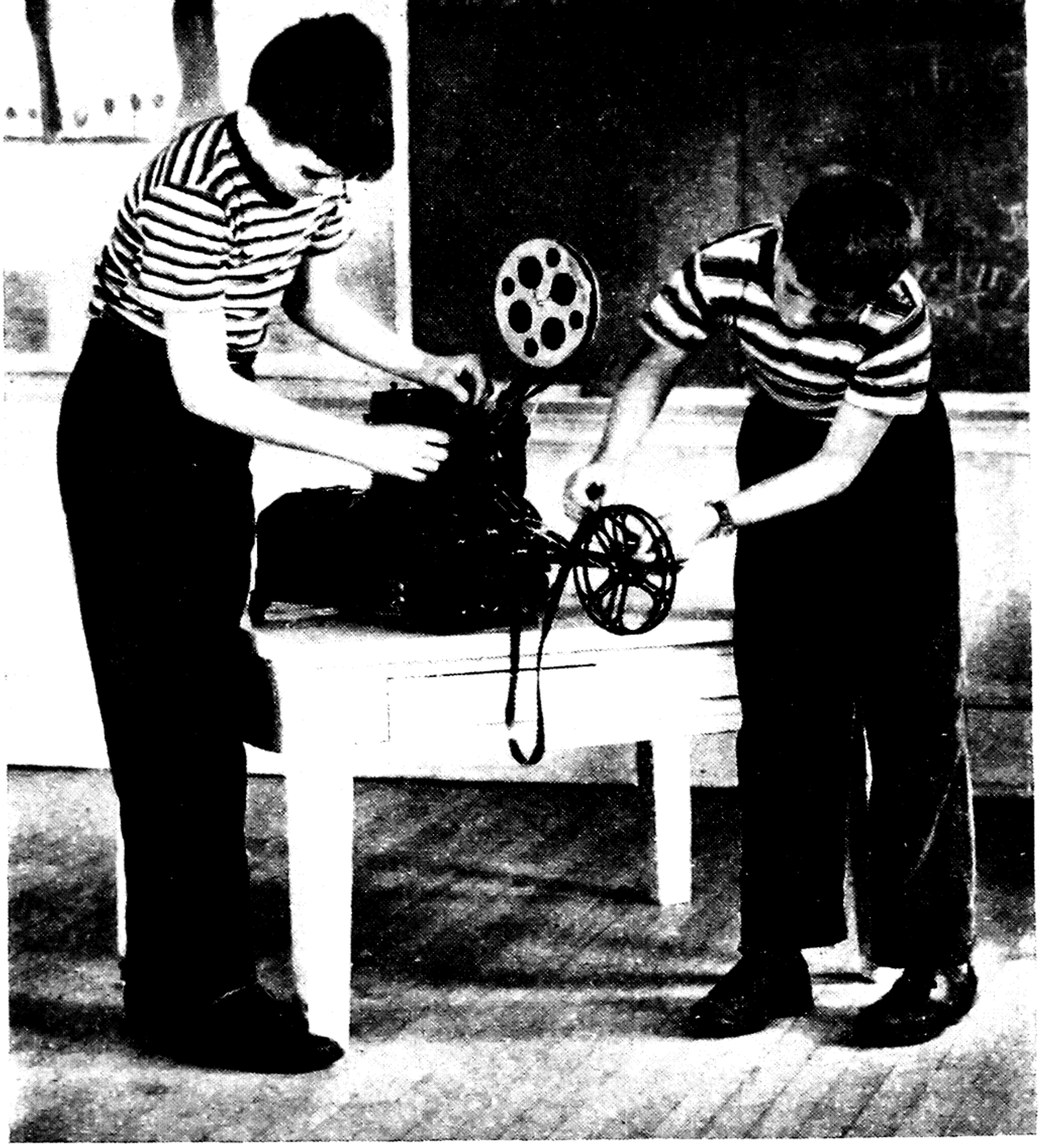
Sizes and Speeds. Decision as to size of motion picture projectors suitable for school purposes is easy to make. In fact the choice rests between a 35-millimeter (1.38 inches), a 16-millimeter (.63 inches), and an 8-millimeter (.315 inches) machine. The first is no longer seriously considered for classroom use because of its complexity, nonportability, cost, fire hazard, and restricted range of film content. This machine is used almost exclusively by commercial theatres, although there are a few in school auditoriums. The 8-mm. machine is almost entirely limited to the amateur. It is a low-cost apparatus for silent pictures. Few educational pictures have been filmed for 8-mm. projectors.

Wisdom and economy demand the choice of the 16-mm. machine. The advent of this machine in 1926 provided the school with apparatus which overcame objections to the 35-mm. machine. It uses safety film, weighs from twenty to seventy-five pounds, projects silent or sound film, is reasonably simple to operate, and has available for its use millions of feet of educational film.

The projection speed for 16-mm. silent films is 16 frames per second and for sound films 24 frames per second. Silent projectors are usually equipped with a rheostat so that the operator may vary the projection speed, but sound projectors are definitely set to project at 24 frames to the second.

Sizes of Reels. Film reels are standardized in units of 400 feet, thus one standard reel of 16-mm. film is 400 feet (or slightly less). Reels are made in units of 400, 800, 1200, 1600, and 2000 feet. Some projectors accommodate only the 400-foot reel, but the majority will take 1600 feet, and a few the 2000-foot reel. Since sound film is projected at 24 frames to the second or 36 feet to the minute, the running time of a standard 400-foot reel is ten to eleven minutes; with silent film the time is approximately fifteen minutes. A reel of film contains about 16,000 separate and distinct still pictures which are closely related.

Types of Illumination. Two general types of illumination are available, one employs an incandescent light and the other a carbon arc. By



These junior-high boys are members of the motion-picture projection squad.

COURTESY OF BATTLE CREEK PUBLIC SCHOOLS

far the greater majority of school projectors are of the incandescent type. This type of projector gives maximum satisfaction for the classroom and is adequate for most auditoriums. Since nearly all parts of the country use 110–120 volt alternating electrical current, most projectors are built to operate on this type of current. Projection bulbs vary in wattage. For classroom use with a "throw" up to thirty feet, a 750-watt bulb is quite ample. With longer "throws," especially in auditoriums, it is recommended that a 1000-watt bulb be used, or even 1200 if the "throw" is forty feet or more. Consideration should be given to the place or places in which the projector will be used, and selection made accordingly. It is unwise to place a 1000-watt bulb in a projector without first checking with the manufacturer of the machine. Sometimes these larger size bulbs cause the machine to overheat.

Carbon arc projectors are used in large auditoriums for long "throws," and to provide greater brilliance. They are more complicated to operate, present more mechanical difficulties, and are more expensive than the incandescent projector. Up to a hundred-foot "throw," the incandescent projector should be used. Reference to the survey of equipment made

by Schreiber shows that carbon arc equipment is not even mentioned.

Arc lamp equipment is completely unsuited for classroom use. In addition to mechanical complications, it may present fire hazards, and is heavy and awkward to move from room to room. It must be considered as "stationary" equipment, with limited flexibility in a good school visual-education program.

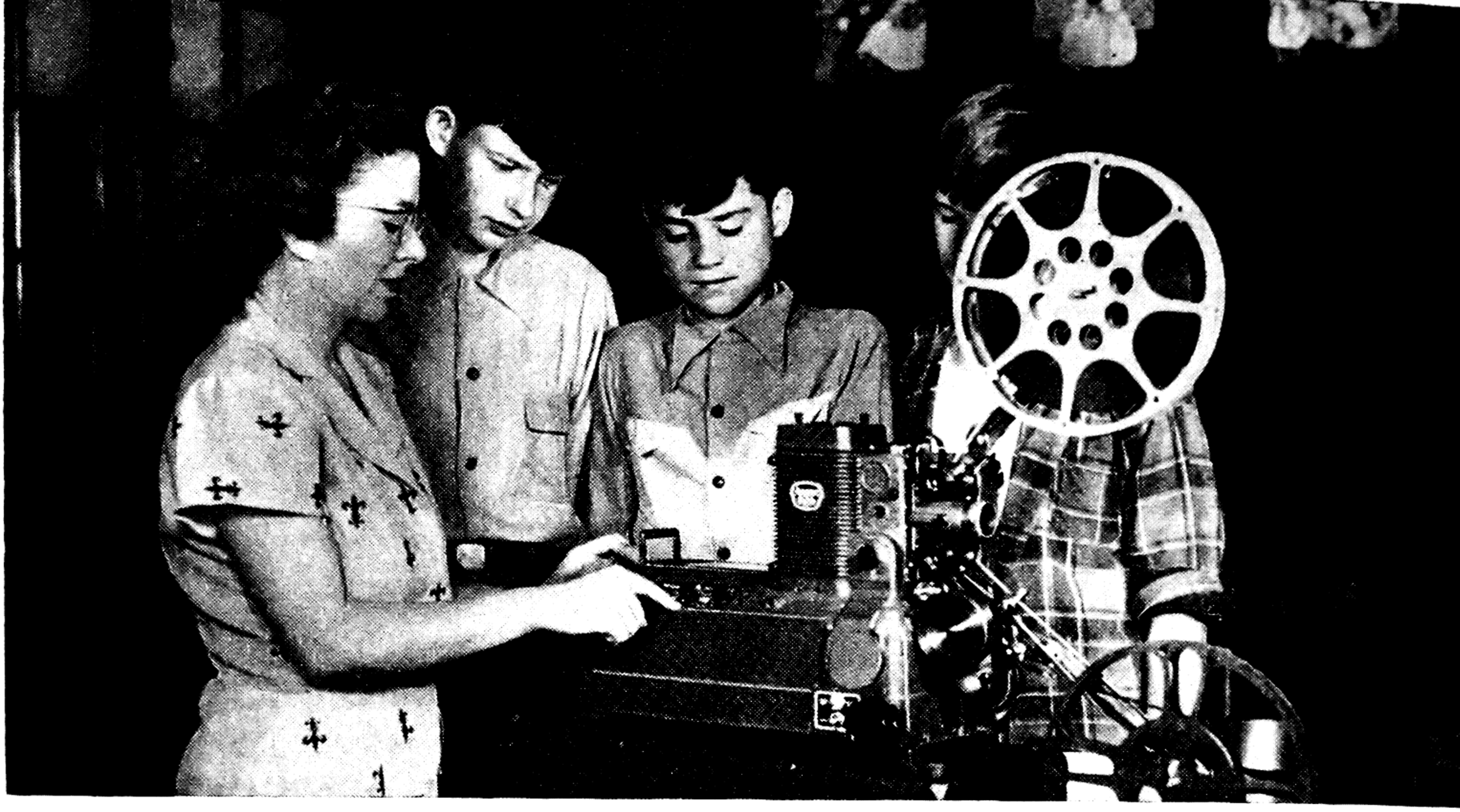
Some experimentation is now under way with vapor lamps for projectors. These lamps appear to have the advantages of producing greater brilliance than the Mazda lamp but are not so complicated as the arc lamp.

Numbers of Projectors in Use. It is extremely difficult to get accurate figures on the number of projectors actually in use in schools. Surveys have been made, but the results are soon obsolete, so rapidly is the field of visual education growing. During the period of 1941 to 1945 almost the entire 16-mm. motion-picture projector production went to the armed services and to industry. Now, the production output is once again going to schools, churches, clubs, and to other civilian, nontheatrical, agencies. According to a recent news item, Eric Johnston, Chief, Motion Picture Association of America, speaking before the National Congress of Parents and Teachers in St. Louis revealed some of the "hard-to-get" statistics concerning the number of 16-mm. projectors in schools. The number of sound projectors has moved upward from 485 in 1936 to 50,000 in 1949. Also, the number of sound films acceptable for teaching purposes climbed from a scanty handful to more than a million prints of some 7,000 different titles.[2]

Kinds of Projectors—Sound and Silent. Both the 16-mm. and 35-mm. projectors are constructed to project sound or silent films. The 8-mm. is limited to silent films only.

No categorical answer can be given to the question as to which is better, sound or silent films. Each has a place, and no point is served by arguing their respective merits. The trend is definitely toward the use of more and more sound films. They are more dynamic, have a greater range of usefulness, are more realistic, and are better liked by both students and teachers. Schools and colleges are purchasing practically no new silent equipment, and current use is almost entirely of sound

[2]*Film News*, p. 21, September, 1949.



COURTESY OF PORTLAND, OREGON, PUBLIC SCHOOLS

These elementary school pupils are receiving instruction in the operation of a 16-mm. motion-picture projector.

materials. Film libraries are purchasing sound films almost exclusively.

Sound-on-film projectors cost approximately twice as much as silent projectors, and are slightly more complicated to operate. But since a projector is a piece of equipment which will last many years, the extra cost if spread over the years, becomes insignificant. A sound projector will project silent film as well as sound film, but a silent projector will project silent film only.

Selection of Projectors. There is at least a dozen standard makes of projectors on the market. It is no more feasible to recommend one projector than it is to recommend one automobile over another. Competition keeps all of the manufacturers on the alert to produce a serviceable, economical machine. In selecting a machine, a school should first determine the type of projector which best fits its educational program, and then go about the business of selecting a particular make. Specifications can be long and exacting, but for practical purposes the following battery of questions will be useful without involving too many complications.

1. Who is the manufacturer? Is he reliable?
2. Who is the local representative? Is he reliable? Can he service the projector for ordinary difficulties or must the machine be sent to the factory?

3. Does the machine show a clear, bright picture?
4. Is the picture steady (free from jumpiness)?
5. Is the machine practically free from vibration?
6. Is the lamp accessible and easy to replace? What is its wattage?
7. Are lenses, reflectors, sprockets, etc., accessible for easy cleaning? Can the machine be easily oiled?
8. Is the machine noisy? If so, is this caused by faulty construction? Does the amplifier pick up projector noise?
9. Is it adapted to the type of current in the building?
10. Is the machine equipped with a rewind device?
11. Does the current used by the machine exceed the maximum load for which the building is wired?
12. Is the machine easily portable? What is the weight of the machine? Can it easily be carried from room to room?
13. Is its operation simple enough that it can quickly be learned by the teacher?
14. May lenses be interchanged easily so that the projector will take care of all the rooms which it must serve?
15. Is the sound clear and distinct without distortions? Does it reproduce both speech and music in a satisfactory manner? Is the volume loud enough or low enough to take care of the various rooms in which the projector will be used? Does it have tone control?
16. What kind of guarantee does the producer give?
17. Does the cost seem to be in line with the cost of similar projectors?

Finally, competitive demonstrations of two or more machines should be arranged under the exact conditions that will exist when the chosen machine is placed in service. The conditions for these demonstrations should involve the following:

1. Have the demonstrations made in your school on the same day and at about the same hour. This will assure against variation in daylight conditions since one day may be bright and another cloudy.
2. Stage the demonstrations in an auditorium, classroom, or both.
3. Use the same screen for all demonstrations, thereby eliminating the screen as a factor in picture brightness.
4. Be sure that the same number of persons are in the room for each demonstration, because this factor may alter the acoustical qualities of the sound projector.
5. Require each demonstration to be made with the same film which should be carefully inspected after each showing. The "test-film" is an important item. It should be a film which has a sharp picture and good sound quality. The film should contain both music and spoken words. It is also recommended that the sound film be one of "variable-area"

recording[3] instead of "variable-density." Variable-area films require more precision in projectors for good sound reproduction.

6. Be sure that each projector used in the demonstration is equipped with the same type of projection bulb both as to wattage and voltage, and the same size lens. This is a most important item and should be checked very carefully in any "side-by-side" performance. The difference in illumination caused by different wattage of bulbs is rather obvious, but the difference caused by different voltage must be checked carefully; a 750-watt, 120-volt lamp is quite different from a 750-watt, 110-volt lamp. The latter although of the same wattage gives a much brighter picture than the former, but the life of the lamp is much shorter; the life of the one lamp is twenty-five to fifty hours, whereas that of the other is ten to fifteen.
7. Have several judges present. These may be teachers or members of the school board, or both.
8. Make your selection on the basis of fundamental performance. Do not be misled by "claimed" merits of gadgets. Many of the gadgets found on some machines are actually injurious to films. In no case are they of much value, and their cost is included in the total selling price somewhere.

Schreiber and Mannino add this bit of advice in selecting a projector:

> Once the place of use has been determined, the specifics of performance may be enumerated: first of all adequate illumination—involving provision for bulbs up to 1000 watts, an efficient shutter system, and a coated lens of F 1.65. An amplifier providing sufficient *undistorted* output and a speaker that will handle this maximum undistorted output make an efficient twosome. An effective tone control, which emphasizes "highs" or "lows" rather than eliminating one or the other, completes the minimum requirements of performance.[4]

Cost is always a consideration in the purchase of any item of equipment, but remember the old maxim, and don't be "penny wise and pound foolish." Purchase a projector that will do the job demanded by the educational program, and one that will serve the school for several years. Basic performance, low upkeep, and long life are the main considerations.

Care of Projectors. No matter how efficient a piece of equipment is, its efficiency is reduced if it is not properly cared for. It is rank extravagance to purchase a good projector and let it deteriorate for lack of proper care or through careless use. Consult a good handbook for details

[3]See page 297 for explanation of types of recording.

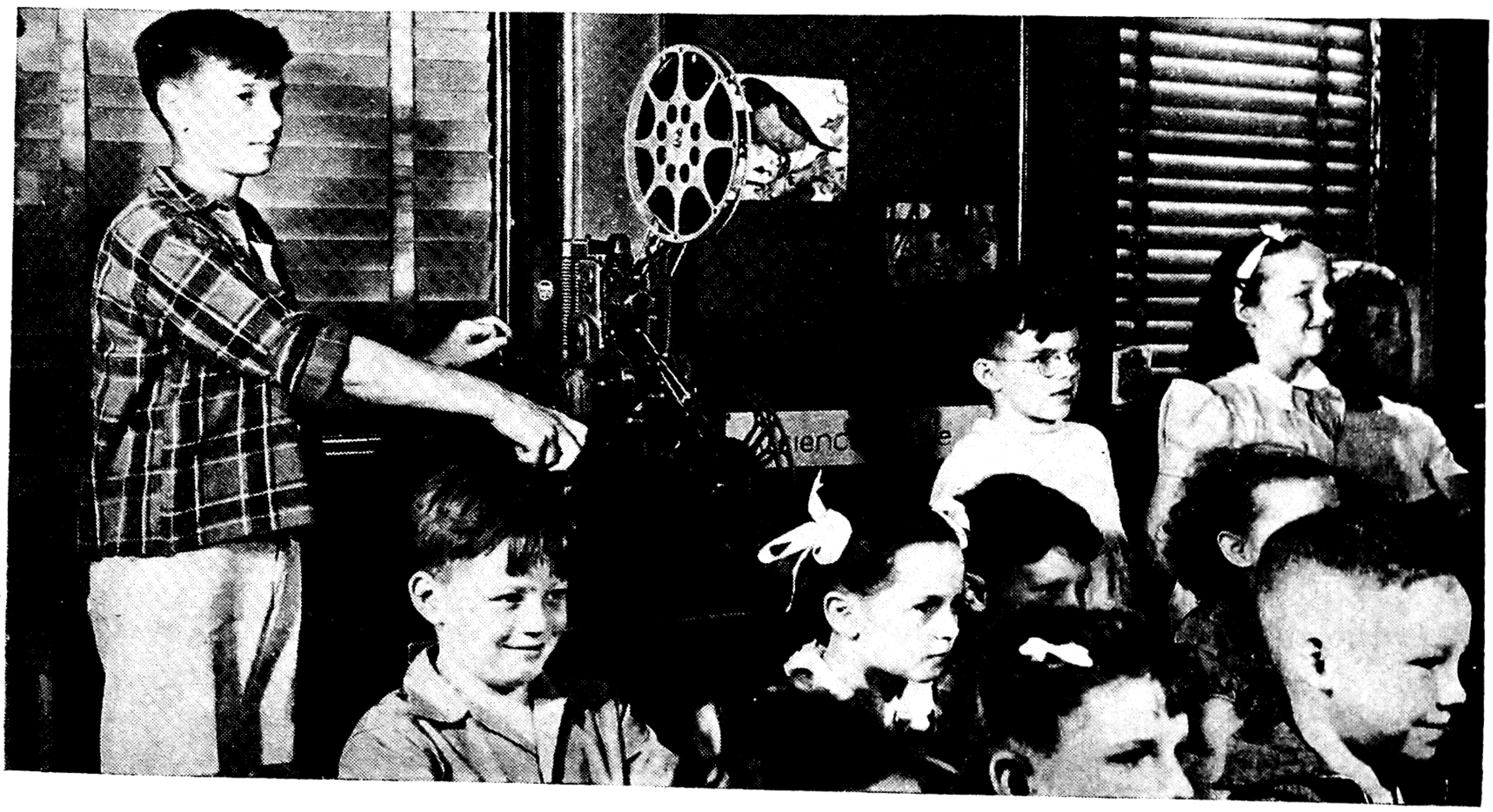
[4]Schreiber, Robert E., and Mannino, Philip, "Practical Problems of Projector Purchase," *Educational Screen*, 24: 28, January, 1946.

concerning the care and operation of the machine, but briefly a few of the salient points in the care of a machine are:

1. Keep the machine free from dust. When not in use the projector should be covered or replaced in a case. Before each showing, the projector should be thoroughly cleaned. The lens should be cleaned with a camel's-hair brush, soft cloth, or lens tissue. Apertures, rollers, and other similar parts should be kept clean at all times. To project a film on a dusty or dirty machine will inevitably result in undue wear of the projector mechanism, injury to film, and a poorly projected picture.
2. Keep the machine oiled. Projector mechanisms are intricate, and some operate at high speeds. They must be properly oiled, but not "over-oiled" with a high grade lubricant.
3. Belts should have proper tension. They should not be too tight nor too loose, because this will affect the projected picture and may even damage the film.
4. Avoid jolting and rough handling. Although most 16-mm. projectors are portable, they must be handled with care. Careless or unknowing hands often toss a projector about thereby damaging filaments and loosening parts. A projector may serve more than one building, but it must be transported with care.
5. Use care in setting up the projector. It is bad practice to block up the front of the projector with books or blocks instead of using a higher projection stand. The projector should not be tilted more than twenty degrees. The stand should be solid, and care should be taken to see

A trained student operator is projecting a film for this second-grade class

COURTESY OF PORTLAND, OREGON, PUBLIC SCHOOLS



that no one trips over line or speaker cords which may result either in the toppling over of the projector or speaker or in the tearing out of the plug and wires.

6. Hold one person responsible for the machine. This will result in better maintenance and longer life of the machine. Responsibility can be fixed; supplies and repairs are then more efficiently cared for. Don't let amateurs tinker with the machine; they are likely to do more damage than good.
7. Keep an adequate stock of supplies and replacements. Lamps, tubes, and belts have a limited life and can easily be replaced without the projectionist's being a mechanically-minded person. Included in the list of supplies should be one complete set of reels—400, 800, 1200, and 1600 feet.
8. Have the projector overhauled periodically. At the end of the school year the projector should be overhauled even though it appears to be in top working order. This overhauling may be done by the local service man if he is competent and equipped to do the work, or the machine may be returned to the factory.
9. Screens must be cared for. Screens left exposed soon collect dirt and become dingy. If they are on rollers, they should be rolled up; others should be covered. Beaded screens will lose their beading if brushed against, or if they collect dirt it is almost impossible to clean them. Wall screens should be painted with a washable paint so that they can be washed when dirty.
10. The care of films is a detailed and specialized operation and will be discussed fully under the heading of "Films" later in this chapter.

Operation of Projectors. Good motion-picture projection in addition to good machines and proper maintenance demands efficient operators. Although projectors are complicated machines, the projectionist need ~~not~~ possess any unusual mechanical ability. No one need be afraid of a projector. Millions of men and women drive automobiles every day without knowing very much about the mechanism. Women thread sewing machines and fill bobbins. Motion-picture operation is not an unlike activity. A few years ago the author was amazed to find a university professor teaching a class in visual education in which each student was required literally to take the motion picture projector apart and then put it together.

Teacher Operators. Any teacher can become competent to operate a 16-mm. projector. Ordinarily only a few hours' instruction followed by a brief practice period result in satisfactory operation. The survey quoted earlier in this chapter showed that the training for teacher oper-

ators varied from one-fourth to three hours with an average of one and seven-tenths hours. Practice beyond this actual learning period provides facility and skill in handling the machine and smoother operation.

If teachers are going to use films as a functional part of their teaching, it seems logical to expect them to be able to operate projectors. Experience has shown that the use of professional operators is not flexible enough to be satisfactory. Student operators may function quite satisfactorily, but, even so, teachers should also know how to operate the machine.

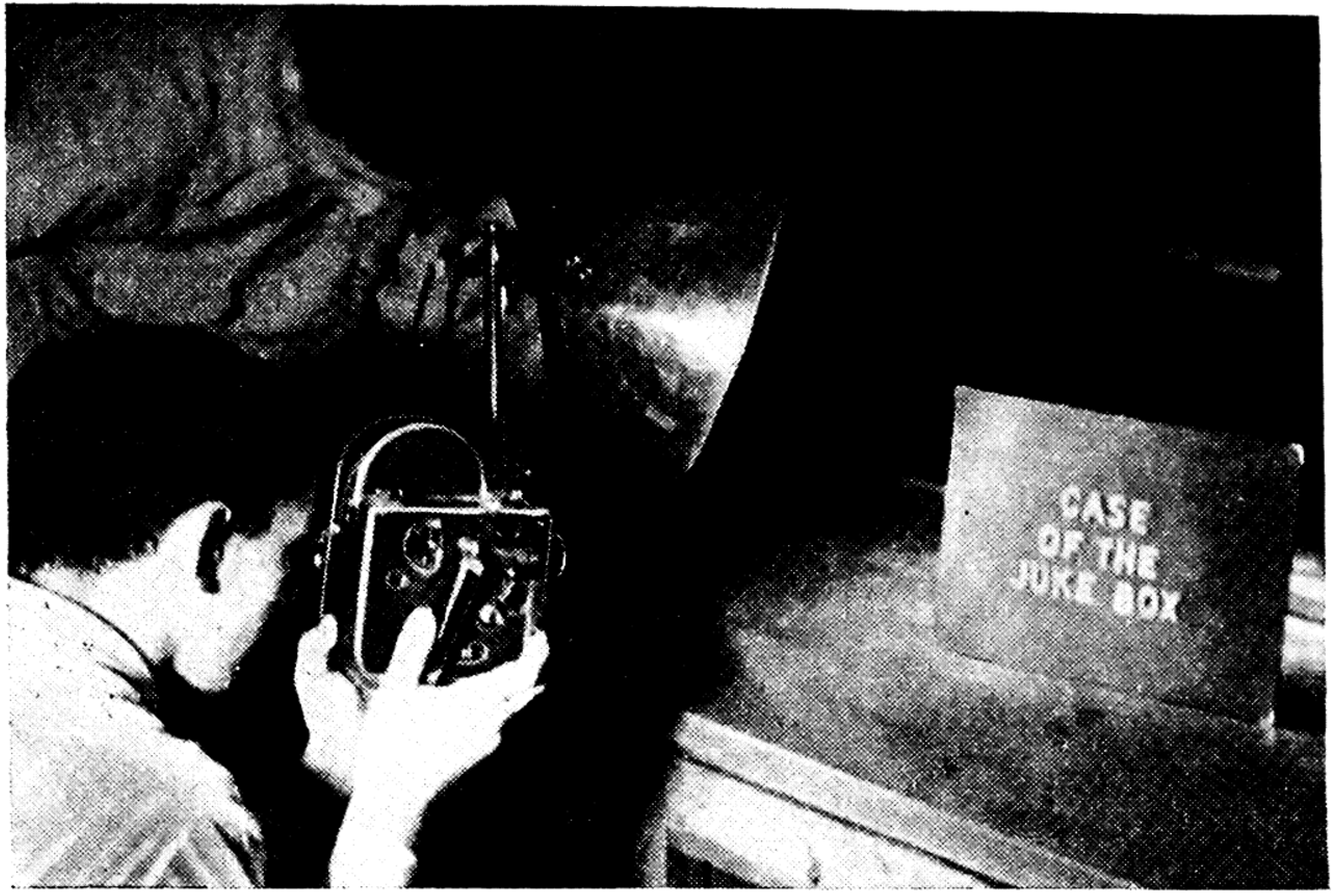
When teachers know how to operate machines, there is quite likely to be more interest in using films, and a greater readiness to use them at all times and under all circumstances. They experience the freedom from having a strange operator (even a student) in the room, and have a feeling of mastery and self-confidence in the use of materials. Knowing how to operate the machine gives teachers independence in varying the schedule as to re-showing or part-film showing, more film previewing, and most important of all actually using more film materials.

There are, of course, some disadvantages in having teachers do their own projecting. Often they will feel that they do not have the time to set up the machine and get ready for a showing. Compromises and adaptations will have to be made and will vary from school to school depending upon varying factors.

Appendix D contains a reproduction of the application form for registration to project nontheatrical motion pictures in Pennsylvania. This registration is handled by the Department of Labor and Industry. This form should be read carefully, since it is typical of the registration procedure followed in many states. Appendix D also shows the "Motion Picture Projectionist Registration Card (nontheatrical)" which is issued to those projectionists whose applications are approved.

Student Operators. Reference again to the survey quoted earlier in the chapter will show that the schools reported a preference for student operators over teacher operators; the percentages were respectively eighty and twenty. Experience proves that selected students make good operators, even boys and girls in the sixth grade.

In a previous chapter it was pointed out that one of the functions which might be performed by a motion-picture club in the school is to provide student operators for various teachers and classes. Students



These students are shooting the title for a high-school film. Other students will operate the projector when the film is shown.

COURTESY OF FOREST HILLS, NEW YORK, HIGH SCHOOL

have great interest in projection, usually take their work seriously, and furnish their respective schools with a great amount of creditable service. It is often claimed that student operators are responsible for a great deal of film damage. This need not be so; if it is, the fault lies not so much with the operators *per se* as with their training, supervision, and the esprit de corps which has been built up.

Student operators should be carefully selected on the basis of their interest, ability, and responsibility. They should not be permitted to teach themselves, but, under the direction of a faculty sponsor, should be given carefully planned instruction. There should be continuous training so that the school will constantly have a large group of student operators in training at all times to take the places of those who graduate or drop out.

Many schools have found it advantageous to issue a "license card" to student operators. Students take great pride in possessing such a card because it is a symbol of their skill and responsibility. Noel has recommended that these students be given an operator's pin on the order of aviation or safety club pins. University or other film distributing centers might provide the pins, cards, or certificates for these student operators. Such a plan might well carry greater prestige for the students if sponsored by a university instead of the local school. Thus an operator's pin issued by the film division of the State University Extension Office would approach the value of a National Honor Society pin.

Good performance depends upon ability to handle certain specific operations concerned with projection. Some of these are:

Setting up projector
Placing speaker properly

Setting up screen
Darkening room
Cleaning projector mechanism—lens, gate, rollers, etc.
Threading; checking the thread manually
Focusing
Framing
Proper picture size in relation to screen size
Tone and volume control
Constant attention to the machine during showings
Checking for film damage during showings
Taking care of breaks in film at time of showing
Rewinding
Oiling machine
Replacing projection lamp
Replacing and adjusting exciter lamp
Replacing fuse
Splicing film (permanent, in workroom)
Cleaning film
Disassembling projector
Disassembling screen (if not wall type)

Obviously the above skills arrange themselves in hierarchies, and not all of them are essential to simple projection. Therefore, it is feasible to plan for classes of operators with cards or certificates classified accordingly. There are certain other skills which might also be placed in a list of the above type such as the ability to diagnose difficulties involving jumpiness, screech in machine, irregular speed of machine, disappearance of film loop, unusual heating of machine, and jerky reel action.

Pencil and paper and performance tests should be given student operators seeking a "license." A series of true-false or other simple questions on the order of those listed by Mannino[5] will serve well for the pencil and paper test. The performance test will place emphasis on proper threading of machine, checking for possible film damage, balancing of tone and volume for optimum sound quality, ability to meet such emergencies as reels dropping from reel-arm, loop disappearance, film break, and so forth.

Professional Operators. According to the survey quoted above, about 5 per cent of the schools use professional or paid operators. This may be a necessary arrangement in some instances, but it is usually a most unsatisfactory one. It is inflexible and not in harmony with a good program

[5]Mannino, Philip, *ABC's of Visual Aids*, Revised, pp. 63–66, M. O. Publishers, Box 406, State College, Pa., 1948.

of visual aids. Actually the operation of machines is only one step in the sequence of planned use of visual aids and should be under the direction of the teacher.

Statutory regulations or labor restrictions may prevail in some localities as restrictive forces. If such do obtain, the educational program will suffer. In most instances where such restrictive factors are in force, the school authorities can overcome them by conferences with the proper officials and a straightforward discussion of the problems. These conferences should bring out such facts as the educational nature of the motion pictures to be used, and the very important one that 16-mm. film is safety stock and is not to be confused with the inflammable nitrate film used in the commercial theatre.

Projection Makes the Difference. A large percentage of the classroom projections, although involving no actual film damage, are poor demonstrations of projection technique. Students become adjusted to clumsy performance and perhaps the distractions are not so harmful as they would seem. There is, however, little excuse for bungling a projection. Poor projection results from ineptitude of the operator or faulty machine maintenance. The foregoing pages have discussed both factors thoroughly. Frequently educational film showings are marred by such faults as these:

1. The machine and screen have not been assembled in advance and the entire class must sit idly by while machine, screen, and room are put in readiness.
2. The machine is started and then must be stopped immediately and the threading adjusted because a check was not made of the threading prior to starting the machine.
3. The machine is started and a dozen or more feet of film leader with a succession of numerals flash on and off the screen.
4. The projector's beam is not centered on the screen.
5. Proper focus and framing take place a minute or so after the title appears.
6. The sound comes on with an ear-splitting boom.
7. The film may even be backwards.
8. Proper tone control is not achieved until the film is half projected.
9. Constant attention must be given to such matters as focus during the entire time of projection because focus may change. Volume may also change and need adjustment.
10. At the end of the showing the film is "run out white" on the screen for several seconds.

All of the above distractions and annoyances can easily be eliminated. Properly trained operators and careful operation are needed. Smooth performance contributes to better class attention.

Projectors Serve Other Purposes. During the discussion of the selection of a projector, attention was called to the fact that the basic consideration should be good clear pictures and proper sound. Gadgets are of little or no value to the projector. Likewise, the projector selection should not be on the basis of its ability to perform other functions such as serve as a public address system. It is true, however, that many sound projectors are equipped with outlets so that a microphone or phonograph pick-up can be used. Within limits these special purposes can be successfully performed by the projector, but they are usually inferior to a permanently installed public address system. This matter of microphone and phonograph use must be considered as secondary. The projector is first of all a motion-picture machine.

MOTION-PICTURE FILM

Size and Material. Motion-picture film has been produced in a variety of sizes, such as 8, 9.5, 12, 16, 28, 35, 50, and 70-mm. in width. Most of these widths have disappeared from the market because of unsuitability and attempts to standardize a small number of sizes. The 35-mm. width is now the standard size for theatrical film; the 16-mm. width for classroom or nontheatrical film; and a limited use is being made of the 8-mm. width for home showing.

Theatrical film, 35-mm., is made of nitro-cellulose and is highly inflammable. The 16-mm. film is made of cellulose acetate and is referred to as safety film because it is a slow-burning, heat-resisting material. The advantage of the 16-mm. film for school use in this connection is obvious. Another advantage lies in the fact that 16-mm. film, being of the safety type, can be shipped via parcel post and need not be packed in metal containers. Care will need to be taken, however, since film material is a soft pliable plastic substance, coated on one side with an emulsion, which is easily scratched and torn.

Sound-on-Film Recording. There are two types of sound recording in general use—*variable-area* and *variable-density*. Variable-area may be noted on the film as an area with a wavelike or rippled appearance bounded

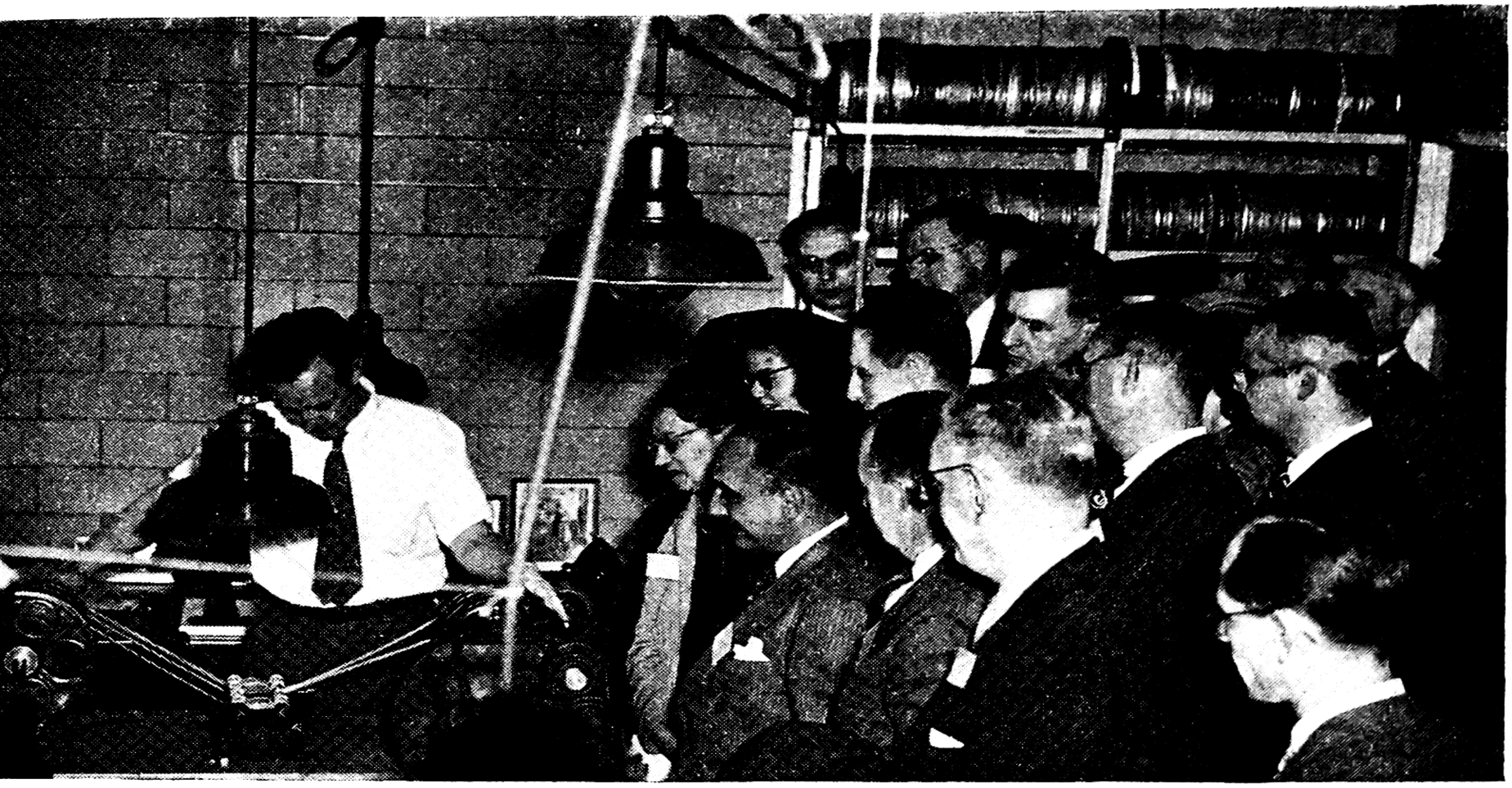
by an area of uniform density. Variable-density is noted by parallel transverse lines corresponding to the frequency and intensity of the sounds recorded. There is relatively little difference in the two types insofar as the reproduced sound is concerned. Some laboratories prefer the one type; some the other. Any sound projector will reproduce either type, yet as was pointed out earlier, variable-area recording demands finer tolerances. If the recording is not perfectly aligned on the film, or if the film vibrates or sways slightly from side to side, the exciter beam will not be centered on the sound track and poor sound reproduction occurs. This exciter lamp beam is only .0001 of an inch wide; therefore, both types of recording demand a high degree of accuracy.

The exciter lamp beam scans the sound track as it passes over the sound head and the light modulations are transformed into electrical current when they strike the photo-electric cell. This current in turn is passed on to the amplifier and then on to the loudspeaker where the current is reproduced as sound.

Film Printing. Sixteen-millimeter motion pictures are photographed directly onto 16-mm. film by a 16-mm. camera, or they are "reduced" from 35 mm. without being re-photographed. Both methods are widely used. The former lends itself particularly to new production intended solely for 16-mm. use. The latter enables the producer to take a picture which was originally photographed on 35 mm. and render it available on 16 mm.

The pictured scenes and the exact accompanying sound track are twenty-five frames or seven and one-half inches apart. If the film is properly threaded in the machine, image and sound will be synchronized. All projectors are arranged so that the sound head is beyond the projection beam, hence the necessity of having the recorded sound seven and one-half inches ahead of the picture. Optimum sound reproduction takes place at twenty-four frames per second.

Film Repair. Every teacher who intends to use motion pictures in her classroom should understand how to repair a broken film. The process is a simple one and needs to be performed only once or twice until the technique is mastered. It is quite possible that the individual classroom teacher will not have any occasion to splice a film because most films sent out for classroom use have been inspected before they leave the film library, and if the projector is properly threaded, breakage is rare. Then,



COURTESY OF THE JAM HANDY ORGANIZATION, INC.

These visitors are watching film printing and synchronizing of image and sound in a professional laboratory

too, in nearly every building there is one teacher who has become an expert with films and will be glad to take care of the mending.

All pre-service or in-service teachers taking courses in audio-visual aids should be taught the mending of film. Every school should have a machine for making splices. Splicers cost from $10 to $15, and their use will ensure proper splices. Film splicing is an act which is easier performed than described. Learning to splice film is one of the laboratory exercises at the close of this chapter. Any good handbook or manual may be consulted for further help.

Care of Films. Dirty, scratched, and torn films give unsatisfactory screen images and are not conducive to the best learning attitudes. Whether a school owns its own classroom films or obtains them from a rental library, they should be clean, pliable, and free from tears and breaks.

Good film care and good projection are complementary. Competent operators using machines in good working order never damage film. In fact it is possible to run a film through a projector five hundred or more times without wearing it out and ruining it, if operator and machine are efficient. Careless and poorly trained operators, and dirty, ill-functioning machines destroy films.

Every time a film is projected, it should be inspected to see that it has not been scratched, sprocket holes torn, nicked, nor splices loosened. Repairs should be made, if needed. This is done by cutting out damaged frames and splicing the ends of the film together. There is practically nothing which can be done about scratches. They cannot be cut out, nor can they be filled in. The only remedy is the positive one of simply preventing them, which is easy enough. Projectors should be kept free of dust, and all parts which the film touches should be carefully cleaned with a soft cloth or chamois moistened with a solvent such as carbon tetrachloride. An orange stick or bone scraper should be used around the film gate; never any kind of metal. Excess oil should always be wiped away. After threading, a check should be made of loops and sprocket locks. Sticking rollers will also cause scratching. The efficient operator watches all these things as a matter of routine, furthermore, he checks the films for sprocket enlargements from time to time during the projection by letting the film pass between his thumb and forefinger before it goes onto the take-up reel.

Film should not be allowed to become dry and brittle. It should be stored in a room or cabinet with a temperature not higher than 65° Fahrenheit and a humidity of 50 per cent. Ordinary use of the film tends to keep it in good physical condition. The winding and unwinding during

Films should be inspected after each showing. Broken, dirty, or marred films ruin programs and are irritating to teachers and pupils.

PCW FILM SERVICE



projection exposes it to the air and tends to keep it alive. Films, like rubber bands, deteriorate more from disuse than from use.

Films should be cleaned periodically if regularly used. This will remove finger marks, oiliness, loosened emulsion, and dirt. Carbon tetrachloride is a satisfactory cleansing agent. Great care must be used in cleaning Kodachrome film because alcohol in the cleaning agent will dissolve some of the chemicals in the colors.

Finally, films should never be stacked on top of radiators nor near heating pipes or vents.

The following "Film Prayer" might well be memorized by every operator. This prayer summarizes good film care so succinctly that it is reproduced here in full.

THE FILM PRAYER[6]

I am film, not steel; O user, have mercy. I front dangers whenever I travel the whirring wheels of mechanism. Over the sprocket wheels, held tight by the idlers, I am forced by the motor's might. If a careless hand misthreads me, I have no alternative but to go to my death. If the pull on the take-up reel is too violent, I am torn to shreds. If dirt collects in the aperture, my film of beauty is streaked and marred, and I must face my beholders—a thing ashamed and bespoiled. Please, if I break, never fasten me with pins which lacerate the fingers of my inspectors. Don't rewind me—my owner wants that privilege, so that he may examine me, heal my wounds, and send me rejuvenated upon a fresh mission.

I travel many miles in tin cans. I am tossed on heavy trucks, sideways and upside down. Please see that my first few coils do not slip loose in my shipping case and become bruised and wounded beyond the power to heal. Put me in my own can. Scrape off all old labels on my shipping case so that I will not go astray.

Speed me on my way. Others are waiting to see me. The next day is the last day I should be held. Have a heart for the other fellow who is waiting, and for my owner who will get the blame.

I am a delicate ribbon film—misuse me and I disappoint thousands; cherish me and I delight and instruct the world.

——A. P. Hollis

PROJECTION SCREENS

There are many types and styles of screens available, nearly all of which will give satisfactory results if daylight is properly shut out. But

[6]Courtesy of De Vry Corporation, Chicago, Illinois.

naturally, some provide better results and fit particular uses more appropriately than others.

Types. The various types of screens can be classified as follows:

I. Those which reflect light
  1. Mat-surface wall screens
  2. Silver or aluminum
  3. Beaded
  4. Improvised
  5. Screen tunnels

II. Those which transmit light
  1. Translucent

Opaque screens which reflect light are the ones most generally used in classrooms and auditoriums. They may be permanently installed and may be arranged to remain exposed, or they may be rolled up into a case much the same as maps. In addition to the permanently installed screen there are portable ones which either hang from the wall or are built on collapsible steel tripods. The portable screen has the greatest flexibility for classroom use.

Mat-surface screens, usually of a wall type, consist of fabric, rubber, composition board, or a selected spot of the plastered wall in front of the classroom. They are given three coats of a flat white paint and enclosed with a narrow black or brown border. This type of surface acts reasonably well as a reflecting screen if kept freshly painted. Some classrooms have the screen painted on the plaster wall above the blackboard in front of the room. Such a screen is always in place and ready for use, but it is too high for comfort, and if long films are shown, the students will tire from looking upward. The mat-surface screen has a particular advantage in the matter of viewing angle, because its brightness is approximately the same at wide viewing angles as when viewed perpendicularly. Therefore, for wide rooms, mat-white screens are much in favor. Viewing angle will be discussed more fully later.

The second type of opaque screen is the aluminum, silver, or metal screen. On the whole this is a poor type of screen. These screens soon tarnish and otherwise produce shadows and bright spots.

Beaded screens produce the greatest illumination but have a narrow viewing angle; therefore, they are best suited to narrow rooms. This type

of screen has a surface covered with tiny glass beads which reflect the light internally, the refraction taking place in such a manner that most of the light is sent back in the direction from which it came. Beaded screens are usually obtained commercially, although they may be made in the school shop by taking a heavy cloth and painting it with an adhesive paint and then spraying or dusting fine glass beads on the wet paint. Beaded screens should be rolled up when not in use, because the beads brush off easily and it is almost impossible to clean this surface if it becomes soiled.

Good screens are inexpensive and no school should try to "get by" with improvisations.

Tunnels or extended wings are often placed around the screen in an effort to shut out light in a room that cannot be properly darkened. This is not a satisfactory arrangement, because this device is awkward and ugly, and, furthermore, the class must be directly in front of it.

The second general type of screen is translucent and light is transmitted through it. The substance is semi-transparent and somewhat like that of tracing cloth or paper. The projector is placed behind the screen and is equipped so as to invert the image before it is focused on the screen. It is much used in advertising and window displays, but has little value for school use. It is limited to use with small groups in situations in which the group is both near and directly in front of the screen.

Mounting on a spring roller is a common way of keeping a screen from collecting dust when not in use. A light dusting will not damage the screen if care is taken to prevent "smudging" or brushing off the glass particles in the case of the beaded screen. Compressed air is most satisfactory.

Location of Screen. Ideally the screen should be placed in the darkest part of the room, but practicality often demands that it be at the front. The screen should be at a height where the bottom part is at the eye level of the seated audience. The projector should then be about four feet high so that the light beams will pass over the heads of the audience. Screens placed near the ceiling cause the audience to look up, with consequent fatigue. In auditoriums, screens are usually placed on the stage and are slightly too high for those near the front, but about the right height for those in the rear, if the floor is elevated. Also, in auditoriums the projector is usually placed in the balcony or a booth near the ceiling;

consequently the picture is projected downward. This is a bad feature if the angle is large and if a beaded screen is used, because, as was explained earlier, the beaded screen tends to reflect most of its light back toward the projector where there are relatively few spectators.

Size of Screen and Picture. Size of picture on the screen is determined by distance of projector from screen and by focal length of the lens used in the projector. Therefore, the operator has flexibility in determining picture size. As a general rule, small bright pictures are better than large dim ones.

Screens are oblong and the relation of height to width is 3:4. Screen and picture measurements are ordinarily given in width only.

Optimum picture width for any room has been determined at one-sixth the distance from the farthest row of seats to the screen. Thus, if the back row of seats is thirty feet from the screen, the screen width should be five feet. Table IV shows projected picture sizes at various distances and with various focal length lenses, although most schools do not use a lens greater than two inches.

Viewing Angles and Positions. How close to the screen should the first row of seats be so as not to waste floor space, yet not be so close as to

Table IV. Projected Picture Sizes for 16-mm. Projectors[7]

Focal Length of Lens	Distance in Feet from Screen							
	5′	7′	10′	15′	20′	25′	30′	35′
	Width of Picture							
¾″ :	2′ 6″	3′ 6″	5′ 0″	7′ 6″	10′ 0″	12′ 6″		
1″ :	1′11″	2′ 8″	3′ 9″	5′ 8″	7′ 6″	9′ 4″	11′ 4″	13′ 1″
1½″ :	1′ 3″	1′ 9″	2′ 6″	3′ 9″	5′ 0″	6′ 3″	7′ 6″	8′ 9″
2″ :			1′10″	2′10″	3′ 9″	4′ 8″	5′ 6″	6′ 6″
2½″ :			1′ 6″	2′ 1″	3′ 0″	3′ 9″	4′ 6″	5′ 3″
3″ :						3′ 1″	3′ 9″	4′ 4″
3½″ :						2′ 8″	3′ 2″	3′ 9″
4″ :						2′ 4″	2′10″	3′ 3″

produce excessive eye strain? Engineers have arrived at the figure of twice the width of the screen, although schools tend to scale this distance down slightly. It has also been found that the length of the row of seats should not be greater than two-thirds of its distance from the screen. This will produce a viewing angle of approximately 30° at the sides. In terms of actual measurements, when a five-foot screen is used the first row of seats will be 10 feet away and 6⅔ feet long, and the back row 30 feet away and 20 feet long. This is a typical classroom situation.

As was indicated earlier in the chapter, the size of the viewing angle is determined largely by the type of screen used. Mat-white screens can be viewed satisfactorily at 30° or even at 60° with fine brilliance and no distortion, but the beaded-screen viewing angle must be kept down to 20 or 25 degrees.

The representations on page 306 show simple line drawings for a wide room with a mat-type screen and a narrow room with a beaded screen.

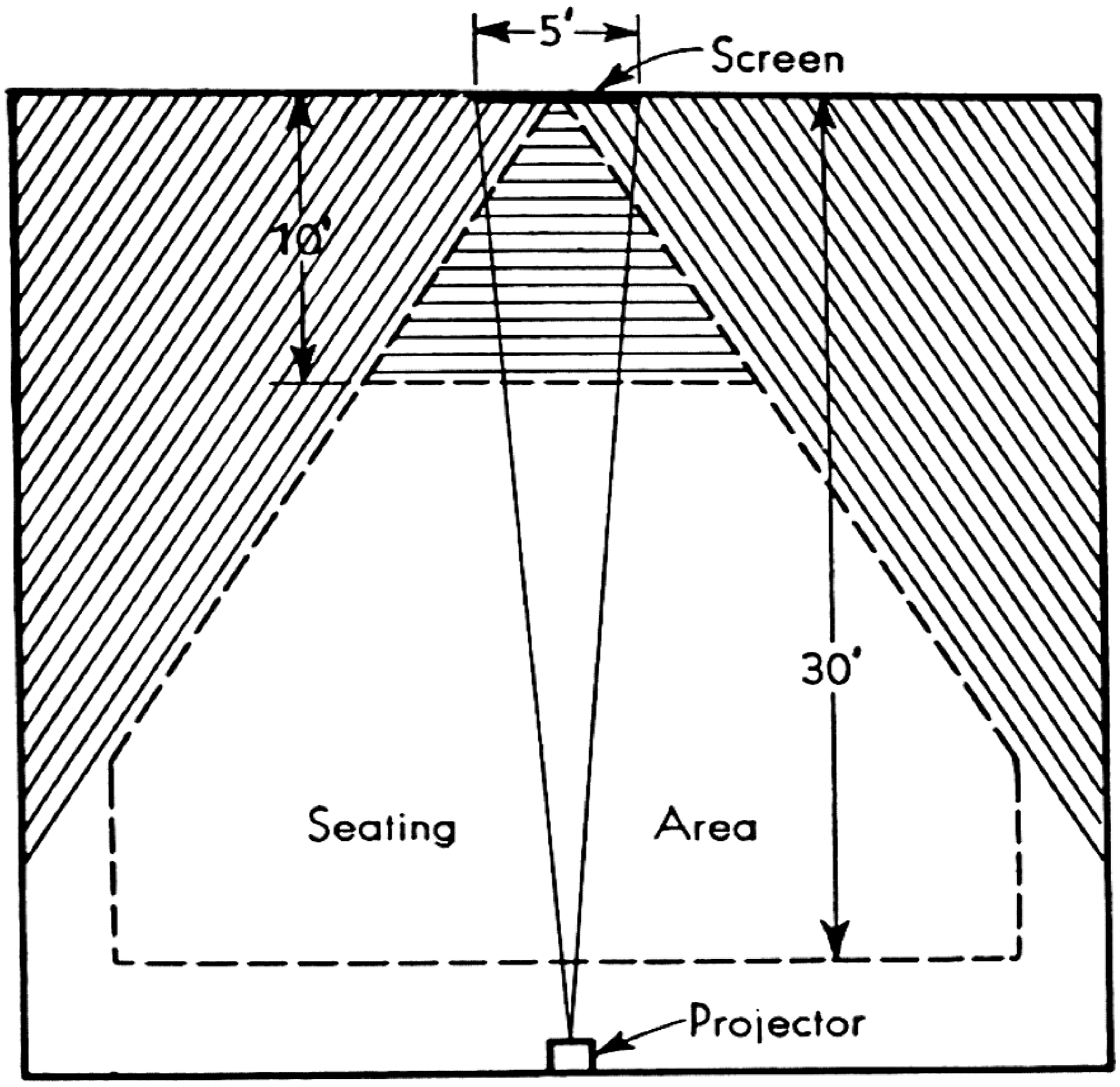
Table IV. (continued)

Focal Length of Lens	Distance in Feet from Screen							
	40′	45′	50′	60′	75′	100′	125′	150′
	Width of Picture							
¾″								
1″								
1½″	10′ 0″	11′ 2″	12′ 6″					
2″	7′ 5″	8′ 5″	9′ 4″	11′ 2″	14′ 0″	18′ 9″	23′ 5″	28′ 1″
2½″	6′ 0″	6′ 9″	7′ 6″	9′ 0″	11′ 3″	15′ 0″	19′ 8″	22′ 5″
3″	5′ 0″	5′ 8″	6′ 3″	7′ 6″	9′ 4″	12′ 6″	15′ 7″	18′ 8″
3½″	4′ 3″	4′10″	5′ 4″	6′ 3″	8′ 0″	10′ 8″	13′ 4″	16′ 0″
4″	3′ 9″	4′ 3″	4′ 8″	5′ 6″	7′ 0″	9′ 4″	11′ 8″	14′ 0″

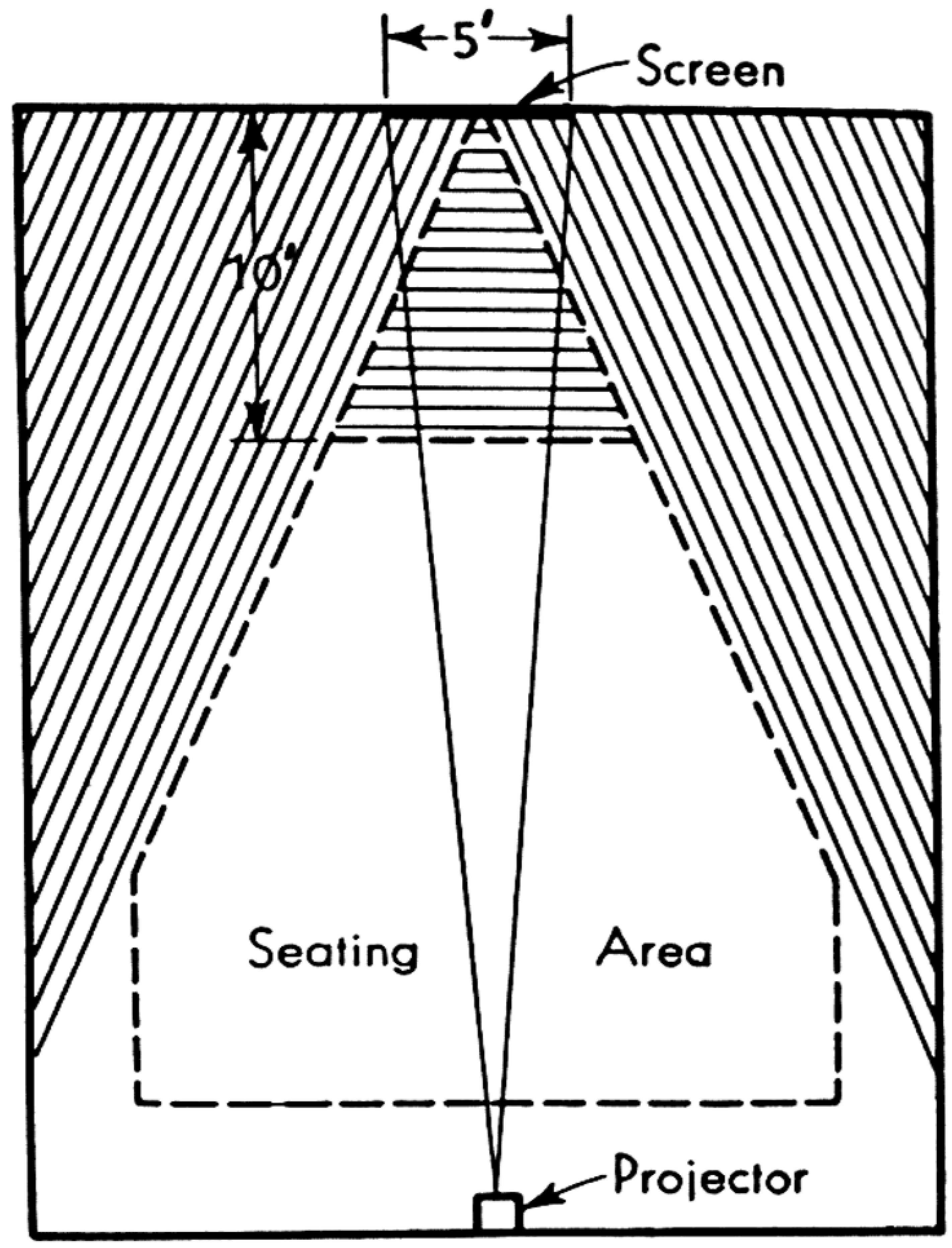
[7]Courtesy U. S. Signal Corps.

OTHER EQUIPMENT

Although probably not indispensable, other very useful items of equipment for the school which uses motion pictures are storage cabinets, rewinds, splicer, film cement, film leader, reels, reel bands, and projection stands.



This shows a seating area for a wide room equipped with a mat-white screen. Shaded area is undesirable for film viewing.



Seating area for a narrow room equipped with a beaded screen. Shaded area is undesirable.

FUTURE DEVELOPMENTS IN PHYSICAL EQUIPMENT

Great improvements have been made in the twenty-five year history of 16-mm. motion-picture projection. Projectors have been simplified, strengthened, and made more portable. There have been improvements in photography and film construction. Chief among these is the addition of a sound track on the film, and the introduction of natural color. Ways have been found to make film more sensitive, thereby obtaining sharper pictures.

What will be the developments in the future? The use made of nontheatrical motion pictures during the war leads to several conjectures. Projectors will probably be lighter as means are found to replace heavy metals with lighter ones or plastics. Threading mechanisms will undoubt-

edly be simplified. There will surely be inventions to minimize film damage. In fact the way is already pointed by safety trips, flexible pawls, and sprockets that lock in the correct position. It should be impossible to throw the machine into gear before every piece of the mechanism is properly in place and locked.

Daylight projection is a big thing that will tax inventive genius. This problem may be solved by improvements in either projector, film, or screen, or it may be that all three must be handled as one. Experiments with polarized light may be of help in this connection.

Research by manufacturers is constantly producing more utilitarian equipment. Although not marked, there is some tendency to try to combine two or more pieces of equipment into multiple-purpose units. Most recent in this field is a blackboard-projection-screen unit.

There is little doubt that the equipment manufacturers will make great progress in the next few years. It behooves educators and other users of 16-mm. nontheatrical motion pictures to keep pace in their knowledge of how to use this instructional medium.

Eric Johnston, President of Motion Picture Association, says, "The day will come, I feel confident, when the motion-picture projector will be as common an item of school equipment as chalk and the blackboards."[8]

[8]Johnston, Eric, "Motion Pictures in Education," *Film World,* 2: 361, August, 1946.



This ultrasonic whistle, out of range of the human ear, changes slides when the lecturer squeezes the bulb. A microphone in the desk picks up the signal.

BY *Life* PHOTOGRAPHER HERB GEHR, COPYRIGHT *Time* INC.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Identify and explain the use of the following terms used in connection with motion-picture projection:

Framer	Threading
Sprockets	Pilot light
Feed reel	Emulsion
Take-up reel	Safety trip
Rewind	Pawls
Lamp wattage	Reflector
Lamp house	Bone scraper
Lamp filament	Reverse mechanism
Pre-focused lamp	Rheostat
Lens mount	Still-picture control
Objective lens	Loop
Focusing screw	Aperture
Focal length of lens	Nitro-cellulose
"F" value of lens	Acetate-cellulose
Speed control	Fuse
Elevation control	Splicer
Micro-tilt	Shutter
Film gate	Belt

2. Identify and explain the following terms which are used in connection with sound reproduction:

Speaker	Photoelectric cell
Sound head	Amplifier
Tone control	Variable-area
Volume control	Variable-density
Exciter lamp	Sound track

3. Compute the length of time the title of a sound film will appear on the screen if the footage measures ten feet. Do the same for equal footage of silent film.
4. Let us assume that you have learned to operate one brand of projector only. How would you tackle the problem of operating another make projector without instructions?
5. What cautions should be observed in threading a projector?
6. How can one avoid film damage during projection?
7. Make a list of the various makes of 16-mm. projectors on the market. Get price range of each. Try to locate what might be termed advantages and disadvantages of each.
8. What would you do (or what is wrong) in each of the following situations:

Switch on projector is thrown and no light strikes the screen
The image on the screen seems too far away
There is excessive flicker in the film
The projector stops
The image is larger than the screen
Projector continues to run, but suddenly the image disappears from the screen and only a white light shows
Sound suddenly stops
"Loop" disappears while projector is running

LABORATORY EXERCISES

1. First of all become thoroughly familiar with the projector and its functioning. (a) Learn to thread and operate it with ease (if two or more makes of projectors are available, learn them all). (b) Be able to identify most of the visible parts, especially those named in Questions 1 and 2 above.
2. Learn how to splice both silent and sound film.
3. You should learn how to make the following simple repairs to your projector:

   Change projection bulbs
   Change exciter lamp
   Put on a new belt
   Remove the lens for cleaning
   Replace a fuse

4. Make a test of picture size, using different lenses and varying the distance of the projector from the screen.
5. If two or more types of screens are available, test them for brightness and distortion at different angles.
6. A trip to the quarters of an Audio-Visual Department of a large, city-school system or film rental library will be most interesting and instructive. Notes should be taken on how bookings are made, film inspected, repaired, stored, and other details of good film care.
7. During the laboratory periods two sound motion pictures, *Sound Recording and Reproduction* (Encyclopedia Britannica Films, Inc.) and *How Motion Pictures Move and Talk* (Bell and Howell) should be projected. The former shows sound recording and printing. The difference between variable-area and variable-density is clearly seen. The Bell and Howell film shows the projector mechanism, its care, threading, and sound recording on film. The closing sequences briefly trace the making of a Hollywood feature film from beginning to end.
8. Screen the film, *Facts About Film*. Produced by International Film Bureau, Inc., 6 N. Michigan Boulevard, Chicago 2, Ill.; 10 minutes, sound, black and white. This film deals with the handling and care of motion picture film. It will be found to be a good review of the discussion of film care of this chapter.

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Chapter 12

THE CAMERA AND PHOTOGRAPHY

A survey of syllabi of audio-visual courses shows that a majority devote one unit to photography. In many institutions persons taking the course are expected to take pictures and develop them as a definite course requirement. More and more institutions offering audio-visual education are equipped with laboratories which include darkroom facilities. It is impossible to think of an adequately equipped audio-visual laboratory or workshop without photographic facilities. Each year more and more public schools are expecting the teachers to provide additional teaching materials through construction at the school—materials that are audio-visual. Even a hasty check of the educational literature will reveal this tendency. Finally, attention might again be directed to the fact that a large number of schools are producing motion pictures of school events, educational units, and public relations materials. During 1947, at least three attempts were made to outline "Standards of Teacher Competency

in Audio-Visual Education." The ability to use the camera and simple photographic techniques appeared in every one of them.

The keystone of the visual instructional arch is the camera and its products. Throughout this chapter, the word *camera* will refer to the machine or instrument, and *photography* to the process of making permanent images, the photographs. The word *photography*—supposed to have been first used by Sir John Herschel, an early experimenter with the processes of making pictures by the use of light—is a combination of two Greek words, one meaning light and the other to write; hence photography means "to write or draw or delineate by the use of light." The common everyday meaning of the term is simply to take pictures by the use of a camera, or more specifically, to obtain images of objects by means of light on sensitive substances which are subsequently "developed" and "fixed" so as to become permanent records.

ORIGIN AND DEVELOPMENT

Camera is a Latin word originally meaning "enclosed with a vaulted or arched cover." Later its meaning was approximately "a room," and the present meaning refers to any one of the many types of specialized mechanical devices for recording images on sensitive substances. The *camera obscura* may be thought of as both a device and a process. As a device it means a "room" that is dark except for the light admitted by a small opening in one side which serves as a lens. As a process it refers to the transferring of images from the outside to the enclosure. The process was doubtless observed by such ancients as Aristotle and Pliny. Roger Bacon made mention of it in a scientific treatise in 1267, but the first precise statement appears to have been made by Leonardo da Vinci around 1500 (undated manuscript). The first description of the camera obscura with a lens inserted in the aperture was made by a Venetian nobleman by the name of Doniello Barbaro in 1568. Johann Kepler, a German astronomer, studied the camera obscura because of its application to optics. Thus it can readily be seen that the principle of photography is not an invention of one mind but a development spread out over centuries.

Thousands of scientists have studied photography and contributed to its development. Only a few of these need be mentioned at this time. In the early eighteenth century in Germany, Johann Heinrich Schulze

made careful observations which gave no practical results other than contributing to the growing knowledge of the principle. In England, Thomas Wedgwood, fourth son of the great potter, Josiah, and Humphrey Davy tried to produce a sensitive paper for use in the back of the camera obscura. They experimented with silver chloride and silver nitrate but were unable to find a way of "fixing" the image so as to render it permanent. In 1802, after Wedgwood's death, Davy read a paper before the Royal Institute entitled "An Account of a Method of Copying Paintings upon Glass, and of Making Profiles by the Agency of Light on Nitrate of Silver," by T. Wedgwood with observations by H. Davy.

The French contributions were more practically fruitful. Joseph Nicephore Niepce was able to make a permanent photograph from an exposure lasting from six to eight hours. Niepce's process was, however, of little practical importance. In 1827, he met Daguerre in Paris and in 1829 the two men formed a partnership, but Niepce died in 1833. Louis Jacques Mande Daguerre had begun his photographic work about 1824. After his partner's death he discarded the approach they had been working on and started out afresh. In 1839 his process of making pictures on metallic plates was announced to the world. Daguerreotype was the first practical photographic process and Daguerre was honored by his government with a pension of six thousand francs annually "for the glory of endowing the world of science and art with one of the most surprising discoveries that honor their native land." The time for exposure had been whittled to thirty minutes, and images were developed and permanently fixed. In 1939 civilized countries throughout the world marked with appropriate ceremonies the hundredth anniversary of photography. A journalist wrote in his account of the anniversary, "The world was blind one hundred years ago. It saw with its eyes, but no one saw more than his own two eyes registered at first hand, and no longer than the image remained on the retina. If a famous man or a famous scene had not been painted at the time, no one who came after could know what the man or scene looked like."

Although photography was an accomplished fact in 1839, much remained to be done. The first successful attempts at portraiture were recorded in the United States when J. W. Draper in 1840 made a picture which required an exposure of thirty minutes in the sunlight with the subject's face chalked to increase the reflected light. Following in order was the invention of wet collodion plates by Frederick Scott-Archer, then

of dry plates, and in 1884 Eastman and Walker of Rochester, New York, invented a "stripping film"—an emulsion image was stripped from a paper-backed support, transferred, and dried on glass. It was an awkward and complicated process, but in 1889, Eastman, with the help of many associates, produced a film with a transparent base of nitro-cellulose. This transparent film remained after development as the permanent support of the negative. In 1891 a daylight-loading film cartridge, the invention of which is now credited to the Reverend Hannibal Goodwin, an enthusiastic amateur photographer and inventor, of Newark, New Jersey, completed most of the basic work. Modern photography had arrived. An Eastman Company advertisement of 1890 is exceedingly interesting. It came after the introduction of the roll film but before the daylight-loading cartridge. The company agreed to load the camera and develop the negative. All the photographer had to do was "press the button." Following the large heading "The Kodak Camera" the advertisement read:

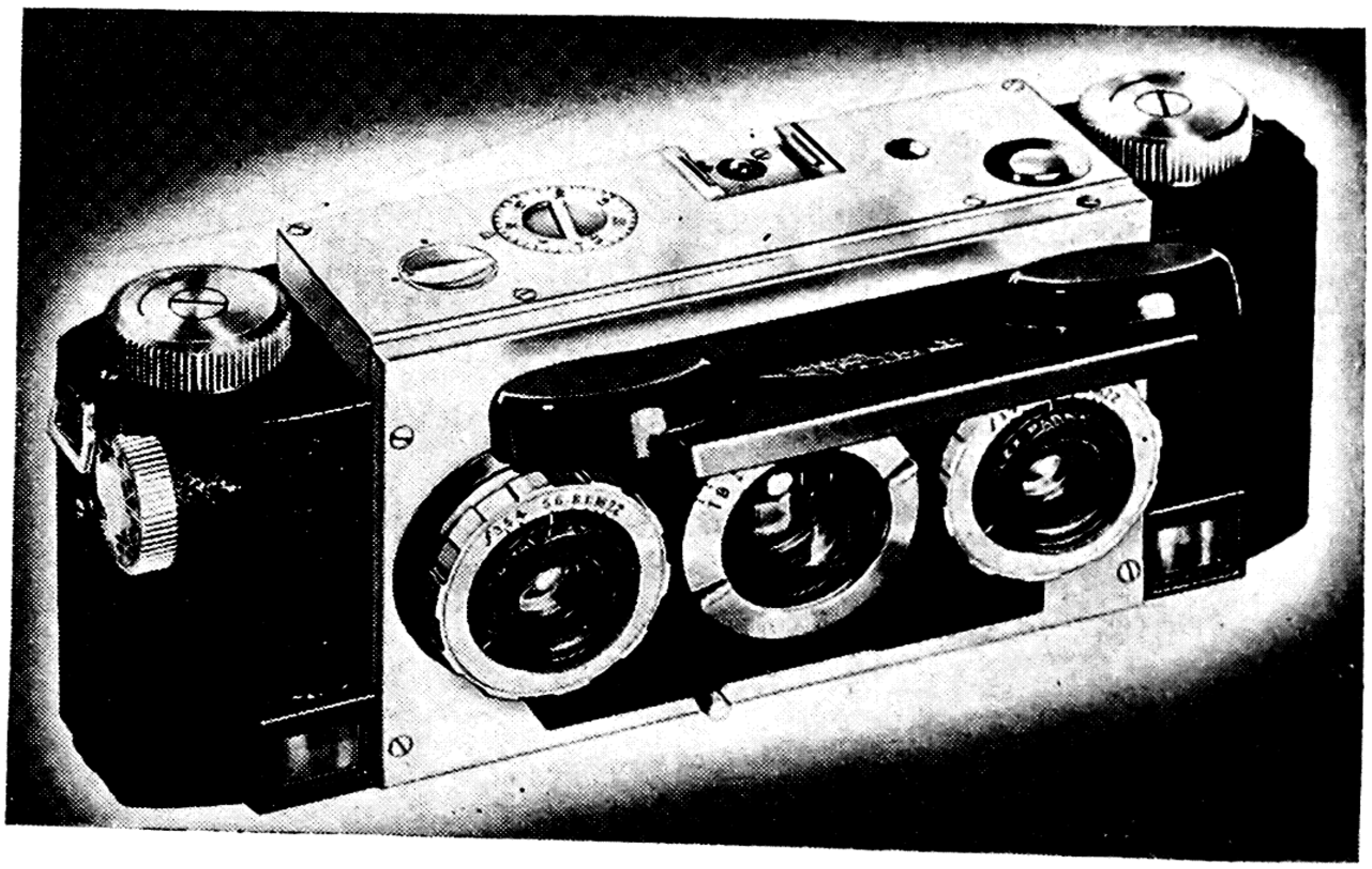
> This wonderful little camera has conquered the world. Those who are at all interested in Photography who have not made themselves the owner of one of these remarkable instruments, have missed more real pleasure than they could ever imagine possible to get out of photography. It is the only Camera that is always ready and never a burden. It is exactly what we claim for it, "a photographic notebook," and no larger Camera can ever take its place in its especial field.
>
> "*You Press the Button,* We Do the Rest."
>
> It affords the simplest and easiest means for making Photographs, and can be used by novices as well as experts.[1]

Three-color photography and natural-color photography are recent developments resulting from the labors of many men throughout the world. The earliest successful photographic color process was the work of the Lumiere family of France in 1904. Rudolph Berthon improved the process in 1908. Improvements and adaptations have followed with great rapidity. The Technicolor Company perfected color motion pictures. Natural-color photography is now common with every amateur cinematographer and candid camera enthusiast.

It should be kept clearly in mind that the foregoing history of photography is not definitive; such a history would require a volume in itself.

[1]From *American Annual of Photography*, 1890, quoted by C. E. K. Mees, *Photography*, p. 29, The Macmillan Company, New York, 1937.

The contributions of many inventors have had to be skipped altogether. Also, much could be said of the chemical and optical processes and changes which have been studied and developed. Suffice it to say that the world is no longer blind, that man can now see things which are not visible to the human eye. The marvels of modern photography bring us actions which are too fast to be seen as well as those which occur so slowly as not to be directly observable. The world of the microscope can also be made into permanent records. Thus, by split-second exposures, time-lapse photography, and microphotography new worlds are revealed. Dozens of other interesting and useful adaptations immediately come to mind, among them aerial and undersea photography. In the march of its first hundred years, photography has moved up from long, tiresome exposures "in the best of light" to exposures timed in split seconds. Improved lens, shutter, and emulsion all contribute their share to the precision instruments of today. Many of them are so small that they can be carried in the palm of the hand—a marked change from 1839, yet *Life* magazine, that much-read (looked-at) medium of general visual education, in noting the centennial of photography arranged for one of its top-notch photographers to borrow an old Daguerre camera and make a self-portrait; result—excellent photography with great depth of focus and fine contrasts. Reasons for this doubtless lie in such facts as (1) Daguerre's camera was fundamentally sound, (2) modern film is far superior to the sensitized copper plates used by Daguerre, and (3) the *Life* photographer was an expert cameraman. A photographer at Massachusetts Institute of Technology has been taking motion pictures at the rate of six thousand per second. This has enabled him to photograph "pigeons, humming birds, and even houseflies in flight; lamp bulbs breaking under hammer blows; craters formed on a liquid surface by a falling



The stereo-realist camera is a third-dimensional camera.

COURTESY OF DAVID WHITE SALES CO., MILWAUKEE

drop of milk; soap bubbles breaking; falling cats twisting in mid-air to land on their feet." Still more recently two Chicago scientists have photographed a bullet in flight by using an exposure of one-millionth of a second, the fastest exposure ever recorded.

Vigorous attempts are being made to produce practical third dimensional cameras and projectors. Stereocameras are available but their usefulness for school purposes is limited by the fact that the pictures must be seen through a viewer. At present only an individual viewer is available. One manufacturer has promised for the near future a projector which will place third dimensional images on a classroom screen.

CAMERAS, LENSES, FILMS, AND EQUIPMENT

Styles, sizes, shapes, and types of cameras are almost legion. The commonest types are generally known as box, folding, hand, miniature or candid, professional, and reflecting cameras. These cameras use films designated as rolls, film packs, cut films, or plates. Nearly every family in the United States owns a camera of some kind with the small roll-film box or folding camera leading numerically. Recent years have witnessed a great popularity in the miniature or candid camera. The designation candid implies a camera using 35-mm. double-frame motion-picture roll film with eighteen to thirty-six frames to the roll. It is also supposed to designate a camera with a fast-acting shutter suitable for catching unposed shots of still or moving objects. The frames of this film measure 1 by 1½ inches. Miniature usually refers to cameras taking very small pictures of the following inch sizes: 1 3/16 x 1 9/16, 1 x 1½, 1 5/8 x 2½, 2¼ x 2¼; and some photographers include the 2¼ x 3¼ picture in this category. Pictures taken by these cameras may be used in two ways, projection or enlargement.

The quality of the camera is usually to be found in the shutter speed and the precision of the lens. Lenses are scaled according to a mathematical system based upon the ratio of the aperture of the lens to focal length. Focal length is the distance from the lens to the principal focus, a point where the image of an object is focused sharply. The brightness of an image varies directly as the square of the diameter of the lens and is inversely proportional to the square of the focal length of the lens. The ratio of $\frac{F.L.}{D.}$ is known as the *f*-value of the lens. The camera manufacturer usually places a band around the front of the lens upon which are marked

the various *f*-values of the particular lens. The change in values is obviously possible by decreases in the effective lens aperture. Thus a 50-mm. lens with an *f*-value of 3.5 at maximum opening will scale down successively to 4.5, 6.3, 11, and 18. Photographs exhibited in salons usually carry a legend at the bottom of the picture such as 50 mm., 1/30, *f*:4.5, Super X. This would indicate a photograph taken with a 50-mm. lens, an exposure of 1/30 of a second, the lens aperture stopped down to an *f*-value of 4.5, and with Super X film. If a filter was used in taking the picture, that is usually indicated, also. Everyone who has used a camera is aware of the fact that the larger the *f*-value, the greater the focal length in comparison with the lens aperture, the dimmer the image, and consequently the requirement of longer exposures. Lower *f*-values mean larger effective lens areas and a greater amount of light admitted. The fastest miniature cameras in the United States have lens values of about *f*:1.5; poorer grades have lens values ranging upward. A majority of the cameras in common use today have lens values of *f*:3.5 or *f*:2.8. Such a lens in cameras for taking either still pictures or motion pictures is quite satisfactory and domestic-made cameras of this type are reasonable in price.



The stereo-realist viewer gives three-dimensional views.

COURTESY OF DAVID WHITE SALES CO., MILWAUKEE

Four types of film are commonly used. They are orthochromatic, panchromatic, fast panchromatic (super pan), and ultra-fast panchromatic (ultra-speed, super XX). Time necessary to expose a photograph depends upon (1) light conditions, (2) kind of subject (light or dark), and (3) emulsion speed of the film. The various types of film have definite uses and should be studied carefully.

Accessories for the camera are numerous and serve legitimate purposes, although not commonly possessed by the average teacher or schoolboy photographer. Many excellent pictures are taken without any extra equipment. Among this extra equipment might be mentioned light meters, tripods, lens-hoods, filters, and artificial lighting devices.

It is hoped that no one will get the idea from the above discussion that photography is complicated or excessively expensive. It may be, but it need not be. Even the simplest device, the pinhole camera, can produce satisfactory results at practically no cost whatsoever except film, its development, and printing. It might be added that the pinhole camera is simply an airtight, double cardboard-box arrangement with a single cut film, 3¼ by 4¼ inches, in the back, and only a pinhole for a lens. Naturally it is suitable only for time exposures.[2] A satisfactory outfit for school purposes is an inexpensive box or folding camera using a 4-inch by 5-inch film. A film this size needs no enlargement in order to make distinct prints.

SCHOOL UTILIZATION

Every teacher should own a camera of some kind. In addition every school should have a camera. It is as necessary a piece of equipment as such items as balances, flutes, vaulting poles, or kilns, yet most schools do not own cameras, and the same can be said of most colleges. This situation may be a result of the fact that superintendents, school boards, and trustees consider the camera a piece of personal equipment. It is also possible that the administrative and teaching staffs have not

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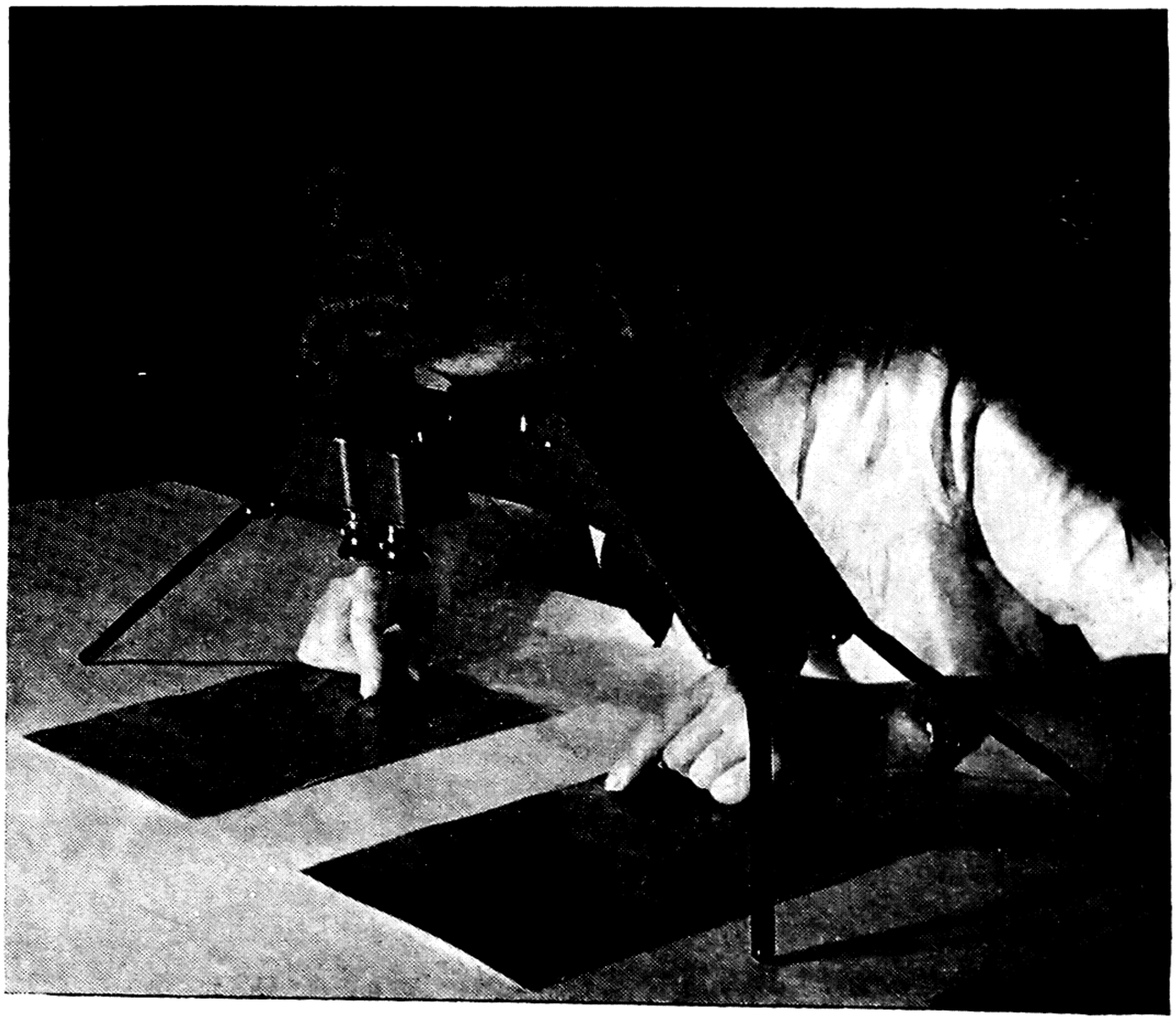
[2]Materials for making pinhole cameras may be purchased from the Educational Division of Eastman Kodak Company, Rochester, N. Y. Directions for setting up the set are included. Materials may also be made outright. Rough materials needed include cardboard, gummed tape, black paper, split fastener, rubber band, and a No. 10 needle or pin. Directions for making this camera are to be found in Neblette, Brehm, and Priest, *Elementary Photography*, pp. 8–36. An interesting example of what can be accomplished with a pinhole camera with young children will be found in this reference, Finch, E. A., "Second Graders Learn Photography," *Journal of the National Education Association*, 28: 20–21, Jan., 1939.

thought of the camera as a true educative device, since it has been in the recreational realm so long.

Much of the earlier discussion of pictorial and graphical representations is applicable to the photographic print because every illustration that appears in newspapers, magazines, circulars, and books is photographic. The original may have been a painting, an artist's sketch, or a line drawing, but it was photographed before it was sent to the printer. Modern methods of collotype, photogravure, and offset printing turn out illustrations of artistic beauty and refinement.

Use by the Classroom Teacher. Few subjects can be named which do not have several aspects which could be more effectively presented through the use of school-, teacher-, or pupil-made photographs. In the elementary school, some subjects have few needs for photography, as spelling and handwriting; but in history, geography, health, nature study, and others the uses are numerous indeed. At the secondary-school level, photography seems particularly applicable as a teaching device for clarifying concepts, adding to new knowledge, stimulating further study, and providing motivation. Learning by looking, whether in school or out, is modern, effective, and interesting. It should go without saying that learning cannot be limited to looking; furthermore, there must always be guards against juvenile simplicity and passive entertainment.

It is quite common for classes on school trips to make a photographic



This young woman is examining aerial photographs with the aid of stereoscopic instruments.

WIDE WORLD

record of the trips. Elementary children visiting a farm, dairy, fire station, or what not, will want to take pictures of what they see. High school students studying slum clearance, transportation, or American history will also find interesting and worth-while uses for the camera. Teachers on summer vacations at Cape Cod or in the Smoky Mountains can bring back valuable firsthand information to their classes.

In the classroom, experiments in the physics class may be recorded photographically. Health and athletic classes can use the camera to reveal poor posture or athletic clumsiness. In a single afternoon the geometry teacher can "spot" enough applications of his subject to arouse interest. These photographs might form the basis for a wealth of practical problems. Occupational subjects of all kinds especially lend themselves to the use of the camera. Art and drama teachers will also benefit from the camera. Uses in English, as in most of the other subject fields, are numerous. For example, the head of the English department in a Western university has a collection of photographs of the *Oregon Trail* route. More recently he has turned his camera to copying and has an excellent collection of 2″ x 2″ slides of London at the time of Shakespeare, the Globe Theatre, stage arrangements, fashions, costumes worn by the major Shakespearean characters, scenes from various plays, Stratford (then and now), Hathaway cottage, frontispieces of early editions of some of the plays, and portraits of actresses and actors who became famous in Shakespearean roles. Some of the slides of the costumes are in color, taken at the time various university groups were staging a play. How many of us have seen high school teachers begin the study of a Shakespearean play by a wearisome encyclopedic biographical study of the bard? What would a set of slides or pictures do to these introductory lessons?

In a Pennsylvania teachers college upwards of four hundred still pictures were taken during one semester. The pictures ranged all the way from the kindergarten to the college and embraced classroom and club projects. The purpose of the pictures was to provide a permanent record of the techniques employed in the creative projects of the college. Many uses were found for the pictures; in addition to being used for interpretation and demonstration in classes, they were used in newspapers, magazines, and college bulletins.[3]

A teacher or a class starting to photograph a series of unit materials for

[3]Emmert, Wilbur, "Photographs Permanently Portray Project Procedures," *The Educational Screen*, 17: 266–69, October, 1938.

study in the classroom, whether still pictures or motion pictures, should plan a "shooting script." This will save time and materials and will organize and objectify the work. Waste motion will be eliminated. What should the script include? Basically these:

1. Objective. What is the purpose?
2. Project? What is to be shown?
3. Content. Where are the subjects to be found?
4. Plan. What pictures will be needed to complete the plan and are they available? What illustrations, graphs, cartoons, charts, or archival documents will have to be reproduced from source material or drawn for this project?

A "shooting script" of this type is analogous to an outline for the writing of a theme. The script might also include questions of presentation and use of the pictures. Doubtless the outline will have to be changed and modified during the course of the work, but that is true of all outlines; and is a good sign, after all, because it denotes growth during the execution of the idea.

The use to be made of the pictures must always be kept in mind. Grade level is important, since pictures suitable for the lower grades may be most inappropriate for the high school and vice versa. Pictures must be truthful; they should present a true characterization of the subject, for if they do not they are as bad as any propaganda or outright misrepresentation. With the lower grades especially, it is important to have something in the picture by which the child may gain a true knowledge of the size of the object pictured. A dog and a cow in separate pictures may seem to be the same size when no object of reference is included in the pictures. Care must be taken that the perspective is not such as to make a hen look as large as a person. The pictures should not include a jumble of objects. It is better to have fewer objects carefully selected and portrayed. The occasional panorama has a place in picture sets but the close-ups and individually photographed objects "tell" the child more. The best travel pictures, for example, show only a few panoramic street scenes; the pictures are commonly of vehicles of transportation, people, costumes, homes, buildings, furniture, fruits, foods, and so forth.

The camera's usefulness to the school has so many ramifications that it is well-nigh impossible to catalog all of them. Safety education should certainly be mentioned, and extracurricular clubs and activities.

Photographing the school records for the office and for the permanent files is an activity which as yet has received little attention but is likely to receive more in the future.

Use by the School Administrator. "Seeing is believing" an old adage goes. Hence it is particularly appropriate for principals, superintendents, and college presidents to want the public, the supporting clientele, the parents, to see what is being done at the institution; how money is spent, instructional techniques, and results. Until recently the annual report of the superintendent of schools was a formidable document in small print read by very few people. Superintendents have found that it pays to have the public informed about the school; consequently, many contemporary reports are beautiful publications with the year's stewardship flanked by artistic photography of buildings, classrooms, sports, clubs, teachers, pupils, and apparatus. Some of the reports, such as those from Los Angeles, Chicago, Harrisburg, and New York City, stand in a class with such magazines as *Life* and *Fortune*. Promotional booklets with pictures by top-notch professional photographers and layouts by competent designers emanate from the private schools and institutions of higher learning. Modern photography and improved printing machinery make these possible. And people read them. The appeal which catches the attention of the prospective student, the parent, or the taxpayer, is the same appeal which will hold the pupil's attention.

Mounting and Presentation. How should photographs be mounted, presented, and filed for future use? Very little need be said here other than to call for a review of this topic as discussed under pictorial and graphical representations. (1) Flat, mounted pictures may be held up before the class, passed among the class, placed in a library for loan for individual study, projected by means of an opaque projector, duplicated (by means of contact prints) and placed in individual albums or booklets, or they may be displayed on walls or bulletin boards. The chief consideration should be to have them used. (2) Transparencies may be made from the negatives and shown by projection. A review of these forms of projection calls to mind the standard photographic lantern slide, the miniature lantern slide, and the filmstrip. (3) Motion pictures, of course, are made solely with a view to projection in a motion-picture projector.

Flat pictures should be mounted if they are to be kept and used. They

should also be properly labeled and there should be some way of filing and storing them. Principles governing mounting are utility and artistry. A good size for mounts is 8″ x 10″. They need not be of uniform size, although there is not general agreement on this point. Different sizes increase interest and add emphasis, and if the prints are to be used in a layout or display panel the entire arrangement can be made more artistic. If the school has a Materials Bureau, the pictures should be turned over to the Bureau for housing, otherwise they may be cataloged and become a part of the regular library, or lastly they may be stored in appropriate filing cases or cupboards in the classroom.

How to Judge a Picture. On pages 100–101 attention was called to Buswell's study of how to look at a picture. In general the viewer's eyes run rapidly over the picture at first in a general survey. Thereafter, the eyes focus on particular details.

There appear to be rather definite "laws of looking." The director[4] of a famous photography school expresses picture success with this formula:

1. The picture must, by its mere arrangement, make you look at it.
2. Having looked—see!
3. Having seen—enjoy!

Stated another way, each print must have a "pictorial imperative," it must command attention to receive initial consideration. This first impression is analogous to the survey movement of the eyes recorded by Buswell. Having looked—See! After the awareness represented by the general survey, there is a delayed survey, a studying of the picture, a seeing. There is no command to do this unless something in the first step of the formula brings it about, or unless, in the case of the classroom, the teacher directs attention to "things" to be seen. Having seen—enjoy! The emotional effect upon the looker is emphasized in the third part of the formula. This is a subjective consideration and was not a part of the Buswell research. Later, attention will be called to those stimuli in the picture which arrest attention and provide startling awareness.

Good photography depends essentially upon two things, the machine and the man behind the button. The first is mechanical and has been highly developed so that there need be few imperfections in pictures

[4]Mortensen, William, *The Command to Look,* Camera Craft Publishing Company, San Francisco, 1937.

owing to poor mechanical devices. How to use the instrument is also more or less mechanical, because of such mechanical devices as light meters, range finders, and tone charts. The other aspect of a good picture is its composition and this is where the true artist comes into his own. No chart or instrument can tell what scenes or what angles will make for artistic pictures. There are certain laws governing composition, just as there are laws governing all design or even as there are laws of rhetoric and grammar, but the successful application of these laws is an individual matter. Experience with and careful study of these laws will improve photographic technique.

Composition is the arrangement of objects and, as stated above, this is a matter of art—of "seeing and feeling." The basic ingredients for composing the picture are line, tone, and color. Line, it is understood, may not necessarily be line *per se,* but edges of fields, fences, streams, roads, buildings, trees, and skylines. Line will need a slightly different interpretation for pictures of a single object. Vertical lines are supposed to produce stability and height; horizontal lines result in breadth and repose. Just as the eye follows line, line also directs the eye movements. Form can do the same thing. Horizontal and vertical lines appear to lead the eye in or out and up or down, resulting in quietness, repose, and comfortable stability. The compositions of such pictures are static; angles, curves, and repeated broken lines produce illusions of movement and are adjudged dynamic. Care should be taken to prevent confusion in the picture by a breaking up of the parts in such a way that they oppose each other. A picture without a center of interest produces restlessness and ennui.

The photographer or the painter must get people to look at his pictures. What, then, are the visual stimuli of the flat picture which get attention? There are many, of course, but the basic ones are:

1. *Balance.* This can be achieved by tones, shadows, lines, or mass. Commonest balance is known as the steelyard which is a mechanical device for weighing. The steelyard employs a lever and weight for balancing bodies suspended from one end of the lever; the lever is graduated and acts as a counterpoise to the body being weighed. In art the principle is best illustrated by dividing a picture into two equal parts and then placing balancing objects in the two parts. This balancing may be left against right, top against bottom, or foreground against background. A good way to analyze the balance of a picture is to draw two imaginary

vertical lines, two horizontal lines, or both vertical and horizontal lines. The elements of balance fall pretty much along these dividing lines. It will be recalled that balance can be achieved through the use of tones, lines, or masses. Open spaces can balance mass. Balance should not be allowed to degenerate into mathematical precision or stereotypy. A wise use of irregularity and the unconventional is much more interesting and will be adjudged better art.

2. *Center of Interest.* Regardless of balance there must be a center of interest or action in the picture. Other aspects of the picture provide balance but they are subordinated to the center of interest. This may be built up through repetition, mass shape, or placement but it calls for accentuation. The photographer composes his pictures by moving his camera about from place to place. In this way he includes or strikes out surrounding details or he moves his skyline up or down. The central area of the picture becomes the field of action. Care must be exercised not to place the subject in the exact geometric center, or the picture will be monotonous. The area around the subject is highly important. The center of interest is forcibly drawn to the looker's attention by comparison and contrast. In order to make the subject stand out, employ a technique diametrically opposite to that of camouflage.

3. *Harmony.* Appropriateness of the parts of a picture is necessary for a pleasing picture. Inappropriateness leads to the bizarre, the fantastic, and pictures without harmony of objects are made. Another way of expressing harmony is to say that the picture must have unity and coherence. The parts of the picture must be held together in some way—a natural way. Storm clouds and streaks of lightning harmonize. The association between the two is close. A cloudless sky and a noonday summer sun hardly harmonize with streaks of lightning and human figures in raincoats and galoshes.

Judging pictures provides an opportunity to develop an evaluation scale or standard so that future pictures will be better. This is true whether one is judging his own pictures or the work of someone else. Scales or score cards are easy to develop so that judging can be more accurate. Since pictures are made of spots, and spots are made out of visible differences, all pictures consist of visible differences, and these general differences can be set down. There are at least nineteen of these general visible differences in pictures, thirteen of which are always present but the remaining six may or may not be present.

Visible Differences Always Present		Visible Differences Sometimes Present
1. Existence	7. Tone	1. Color
2. Number	8. Edge	2. Depth
3. Size	9. Surface (texture)	3. Motion
4. Placement or position	10. Unity	4. Balance
5. Shape	11. Clarity	5. Duration
6. Line	12. Emphasis	6. Harmony
	13. Rhythm	

Some of these points have already been discussed at length; the others are sufficiently easy to understand and it will not be necessary to discuss them here. Taken together, they are the factors that need to be considered in making a picture. If these factors are intelligently used and freighted with the correct mixture of "feeling," good results will be produced.

Holding a Photography Exhibition. Any school which has developed some interest in photography by teachers or pupils or both should consider holding an exhibit of the craftsmanship demonstrated. A great many schools have active camera or photography clubs, the members of which are taking pictures constantly. An exhibition will encourage those already interested and will also interest others. It is well to repeat at this time that photography is a worth-while and fascinating recreational pursuit as well as an instructional medium. The boy working in his darkroom during the evening is not on the streets. It is generally agreed that hobbies are excellent for people of all ages and all walks of life. Photography is growing by leaps and bounds as a hobby, and it is not necessarily an expensive hobby.

If an exhibition is to be held, it goes without saying that there must be space for it. The kind of space needed is wall space. Any well-lighted room will do. Burlap may be draped over blackboards or unsightly fixtures. Temporary partial partitions may be made in the shops and set up in the room to provide extra wall space, if needed. Committees should be appointed to supervise details and distribute the labor and responsibility. An opportunity should be given every pupil in the school to see the exhibit by suitable announcement in the school paper. Awards may or may not be given. Other students may be asked to ballot on the pictures to ascertain the one with greatest popular appeal. Art classes may

wish to analyze the composition of the pictures. The P. T. A. or other community groups may be invited to witness the exhibit. Literally dozens of appropriate activities could be correlated with the exhibition.

SUMMARY

Among the great inventions of modern times, the camera ranks near the top. A former president of Lehigh University[5] places the lens first in his list of fifteen "decisive inventions," inventions which have changed the destinies of races and continents. The lens is included in this list because "it has revealed new worlds." Photography makes mental images concrete and realistic. It is a great teacher in itself and an equally able assistant to the classroom teacher. It is not restricted to a limited field or a particular grade level. The invention of printing in the fifteenth century raised education from lecture and dictation to individual study of sources such as the textbook, reference volume, encyclopedia, and dictionary. Modern photography with its concrete appeal, its natural realism, its possibilities for extending the scope of learning from the textbook to objects from the four corners of the globe, its natural interest and thought-provoking effects, and its promise of faster and more efficient learning, marks another significant step in advancing educational practice. Without interest, observation, experimentation, and symbolical language, education worthy of the name cannot be achieved. The contribution of photography to education is obvious. Advertisers know the value of a picture. Educators, too, are beginning to realize its value both as a teaching medium and as a vocational and avocational instrument.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Make a list of camera projects for a second-grade class. For a sixth-grade class.
2. Prepare a still-picture shooting script to be used in connection with a "clean-up, paint-up" campaign.
3. How far should teachers go in encouraging amateur photography by pupils?
4. What is the difference between Technicolor and Kodachrome film?
5. Prepare a list of principles that should guide teachers in the technique of using still pictures in the classroom.

[5] Williams, C. C., address before the Newcomer Society, reported in *The New York Times*, Jan. 14, 1940. His list of decisive inventions is: lens, gunpowder, magnetic compass, printing press, blast furnace, steam engine, power loom, electric telegraph, internal combustion engine, electric lighting, motion pictures, and radio.

6. Prepare a score card for use in judging pictures in a school photographic exhibit.

LABORATORY EXERCISES

1. Arrange a photographic exhibit of separate mounted pictures or panel displays for use in a store window or on a bulletin board, centered around some school activity.
2. Hold a photographic exhibit of the camera work of the members of the class. Arrange the pictures in classifications: miniatures, snap shots, enlargements, and color photography, etc. Use the score card which has already been developed by the class for judging the exhibit.
3. Obtain a dozen or more printed annual reports of superintendents of schools and analyze the photographic content. Draw conclusions.
4. If cameras and a darkroom are available, take some pictures and learn how to develop them. Make sets of 2″ x 2″ transparencies and 3¼″ x 4″ slides by contact printing. Consult any good photographic manual.
5. Arrange to screen one or more of the following films which deal with the camera and photography. These films are all silent, one reel length, and were produced in 1941. They may be rented from Religious Film Association, 35 West Forty-fifth Street, New York, N. Y.
   How to Use Your Camera
   How to Use Filters
   Exposure and Exposure Meters
   Film Editing
   Lenses and Their Uses
6. *Photographic Darkroom Procedures,* a filmstrip of six separate titles which deal with every step in developing film is available from Text-Film Department, McGraw-Hill Book Co., Inc., 330 W. 42nd Street, N. Y. 18. Purchase price, $24.00; available on rental basis from selected film libraries.

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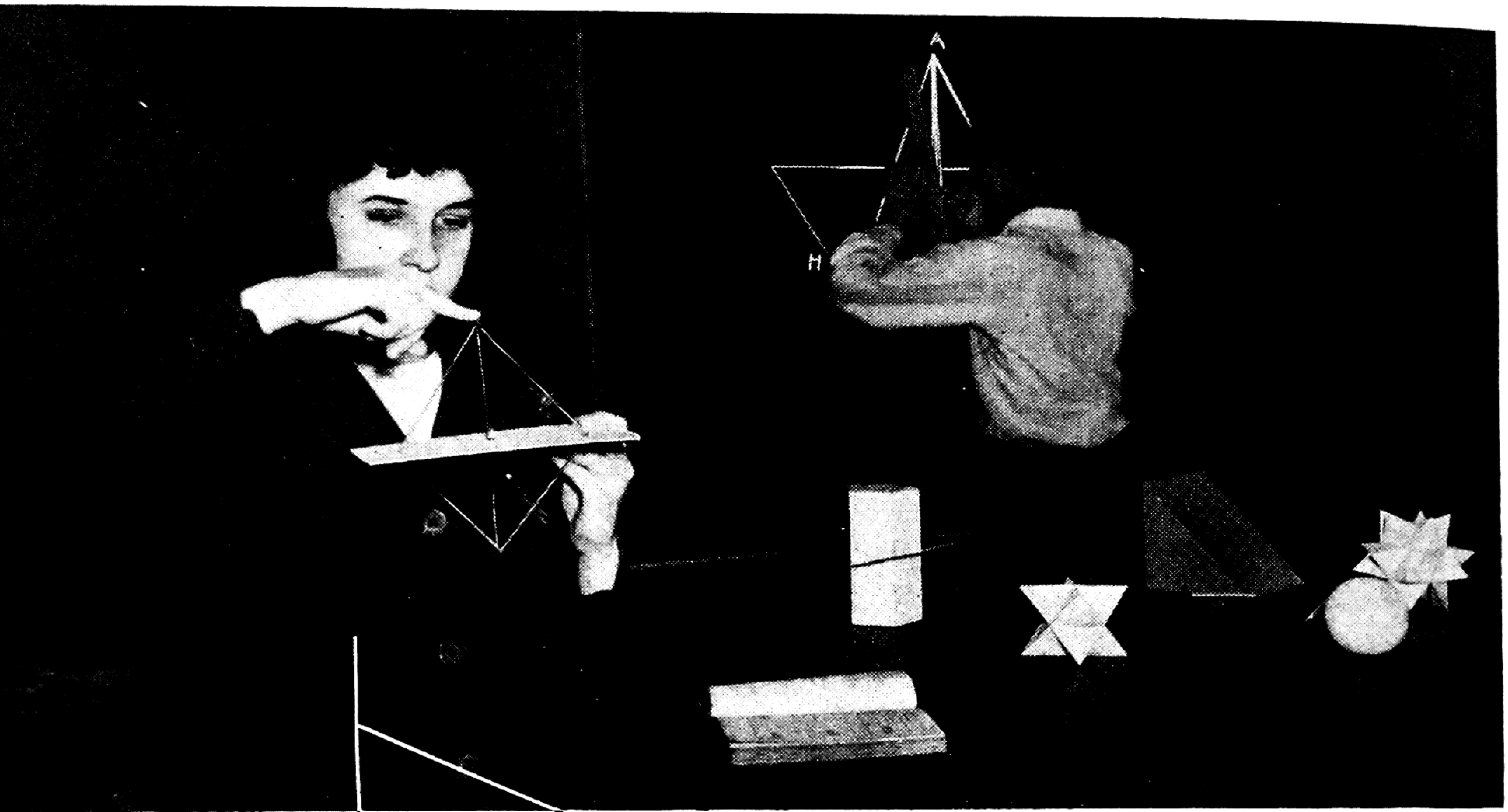
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Chapter 13

REPRESENTATIONS AND DISPLAYS

Observation is an indispensable segment of man's learning sequence. Some abstractionists, however, are prone to place a very narrow interpretation upon observation. True observation is not merely a superficial perceptual process; it goes beyond that and involves thinking, interpreting, contrasting, and comparing. In addition to the sensory process of seeing, observation involves the neural processes of association and assimilation.

In the modern school, materials of instruction are thought of as including anything and everything which aid children and youth to grow and develop physically, mentally, morally, spiritually, and socially. These things put together make up one's environment. This environment not only influences particular acts of people at particular times, but it plays an important part in determining the physical, mental, moral, spiritual, and social development of society as a whole. But man is not completely at the mercy of his fate. Lincoln suffered from an im-

poverished early environment, but he mastered it so effectively that he acquired amazing insights into the way things operated and how man functioned. Environments are rich or impoverished; but with direction, the child masters the environment and is not molded willy-nilly by it. The child experiences his environment minute by minute, and day by day, and these experiences pile up through the years. It is also the function of the teacher to help the child make his environment richer, more meaningful, and ever-widening in scope. An abundance of challenging materials in the classroom is an essential part of the child's development. Experience comes through the operation of the senses in close relationship with materials of every kind.

The present chapter treats of materials and things which can be brought into the classroom for experiencing. These are three-dimensional, whereas, the materials treated in preceding chapters are two-dimensional. Blackboards and flat pictures are two-dimensional graphic aids. The motion picture is essentially a projected two-dimensional graphic aid. Three-dimensional materials are either real life things or representations. While many of them are simple, others are more complex; they must be understood, if, later, complex thought processes are to be developed. Vocabulary and power of expression depend upon this understanding. Objects, specimens, samples, relics, collections, and models play an important part in the development of the individual. When these material objects—the original work of man or nature, are brought together and arranged for study, the school has a museum. Some of the material objects may be too complex, too large, too costly, too dangerous or too scarce to be brought to the classroom, hence the need to fall back upon representations of them.

Man has shown great ingenuity in constructing representations both of visible materials and invisible processes. This ingenuity has resulted in many different varieties of classroom visual-aid equipment. Some of them have been in use for a number of years. Models, mock-ups, dioramas, sand-table reliefs, carvings, miniatures, and similar representations are of inestimable value in teaching. They stimulate the learner to want to know more about them and how they function. They clarify instruction and make it more meaningful, thus providing an appropriate milieu in which an efficient learning process can take place. Realistic and concrete things enable the child to get correct ideas concerning weight, color, texture, dimension, value, and function.

COMMON OBJECT MATERIALS

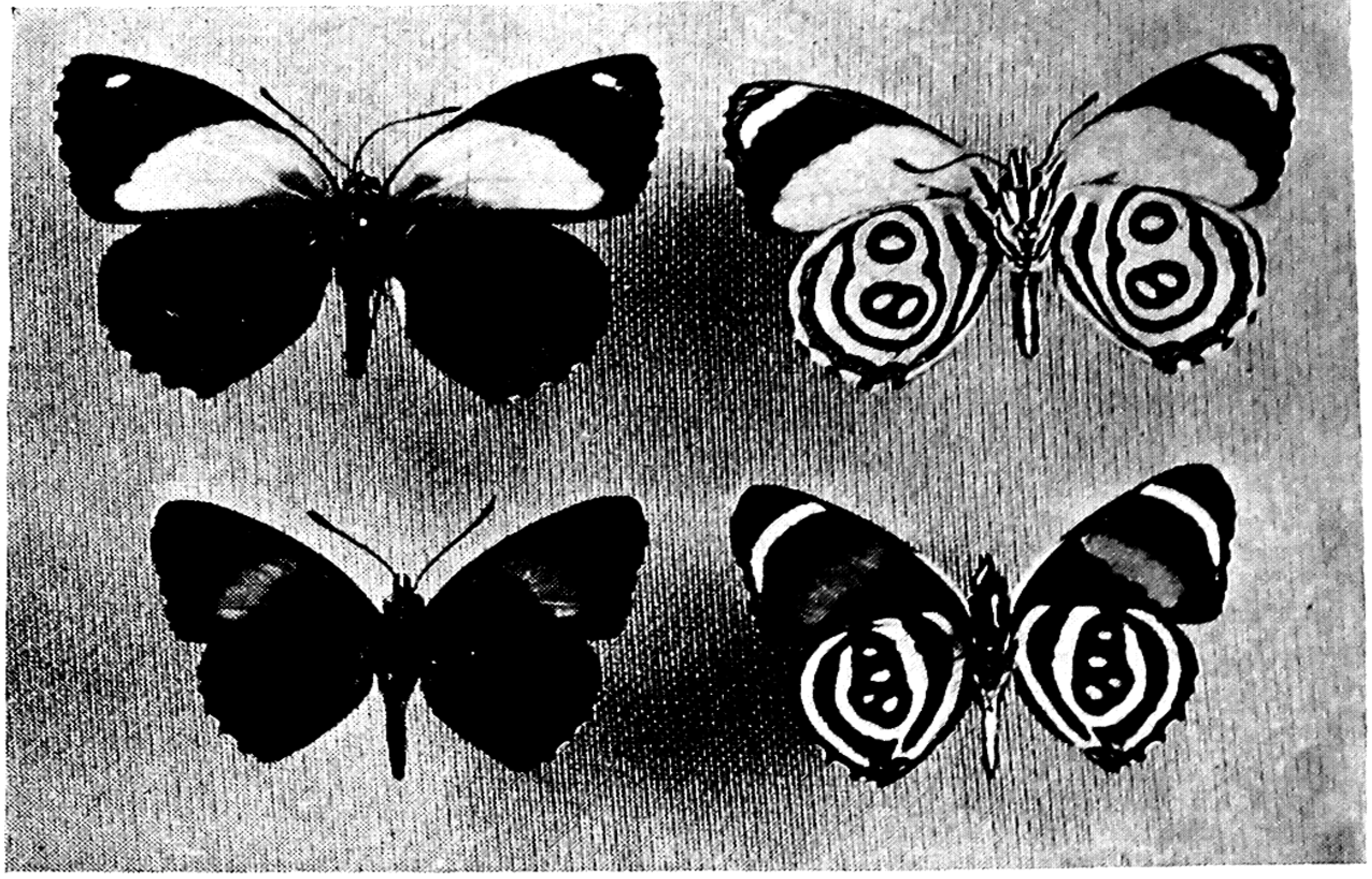
The use of objects and specimens in teaching is not new. Originally nearly all teaching was of this type, and modern teaching methods have been evolved from this early method. Geometry, as the name implies, was measurement of land. Greek and Roman schools used pebbles and counting boards to make calculations, and the ancient classrooms were adorned with trophies, busts of famous men, and pictures cut in stone to depict historical events or mythology. Much of this concrete approach to teaching was supplanted in the Middle Ages by verbalistic methods. It was only natural that a reaction against verbalism and formalism would eventually occur. Comenius wrote, "present the thing itself and the real intuition of it; then the real explanation for the further elucidation of it." Rousseau maintained, "in general never substitute the sign for the thing, save when it is impossible to show the thing." Pestalozzi, in the eighteenth century, held that "sense impression of nature is the only true foundation of knowledge," and accordingly emphasized the field trip for observation and object material for sensory experiences. For teaching in his new colony, William Penn advocated observation and participation. Benjamin Franklin advocated the same procedure.

Good as textbooks are today, they are only one aspect of the teaching-

Exhibits like these rock specimens bring realism into the classroom.

COURTESY OF ATLANTA PUBLIC SCHOOLS





Children who use these butterfly specimens for study will carry lasting impressions of color, size, and texture.

COURTESY OF WARD'S NATURAL SCIENCE ESTABLISHMENT, INC., ROCHESTER, N. Y.

learning situation. Their symbolic character needs the corrective of concreteness. The telephone transmitter, for instance, may be thoroughly described in a text, but this description needs to be supplemented with the real object if the student is to gain a complete experience involving, in addition to the mechanical principles, weight, texture, size, shape, dimension, and intricacy.

Objects and Specimens. Materials in this group are frequently referred to as realia. They are real or authentic things. Realia include such items as objects, specimens, samples, relics, artifacts, souvenirs, and even models and dioramas. These materials are basic three-dimensional substances. No other learning materials can replace them. *Objects* are the things themselves such as flowers, animals, transmitters, stones, and garments. *Specimens* are parts of things; one of a class or group taken to represent the whole group, and to be regarded as an example of its kind. Wide use is made of specimens, animate or inanimate, in schools. For generations teachers have used whole objects or specimens in their teaching. Bits of wood, cloth, fur, or a handful of grain, or vials of oil are brought to the classroom for intimate study. *Models* are replicas or reproductions of things such as public buildings, machines, body organs, animals, cities, and real-life scenes. *Souvenirs, curios,* and *relics* fall into this same classification of common object materials. Relics mean the same to history classes, that specimens mean to biology classes. Such relics as old newspapers, pictures, maps, tools, furniture, weapons, and garments are invaluable as teaching materials. The term *sample* has taken on a special meaning in addition to its general meaning of a part which shows what the remainder is like. A sample as a visual material is rather

generally limited to a part of a commercial product or process such as samples of petroleum in various stages from crude oil to refined lubricants. The *commercial exhibit* is about the same thing, and is designed to show articles in different stages of manufacture, materials used, or steps in processes. The commercial exhibit will be discussed further in connection with the museum.

All of the objects and variations mentioned above have three dimensions and are usually in natural color. They may be handled and viewed from many angles at close range. A motion picture of a cotton field with close-ups of a cotton plant are valuable in an over-all way because they help round out the total "cotton concept," but they do not take the place of allowing the child to take into his hands cotton seeds, fibers, linters, bolls, and plants.

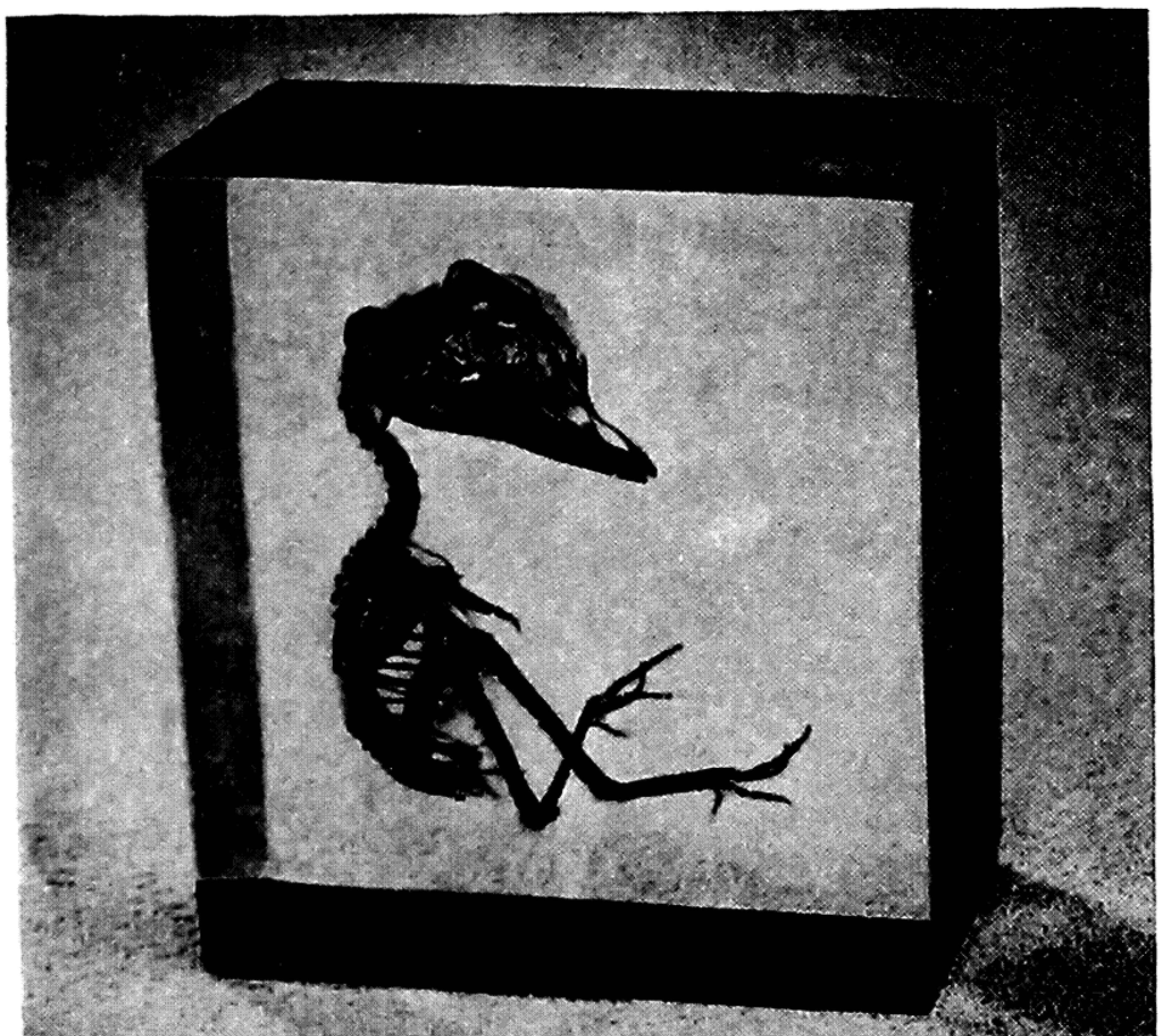
The Model. Because models take on special significance, they are accorded special, although brief, treatment at this time. By definition a model is a three-dimensional representation of an object. It may be a replica such as a facsimile, but usually it is a small-scale reproduction of an original object. As such, a model is a secondhand learning material; but next to seeing a thing in reality, the model is one of the most valuable educative materials.

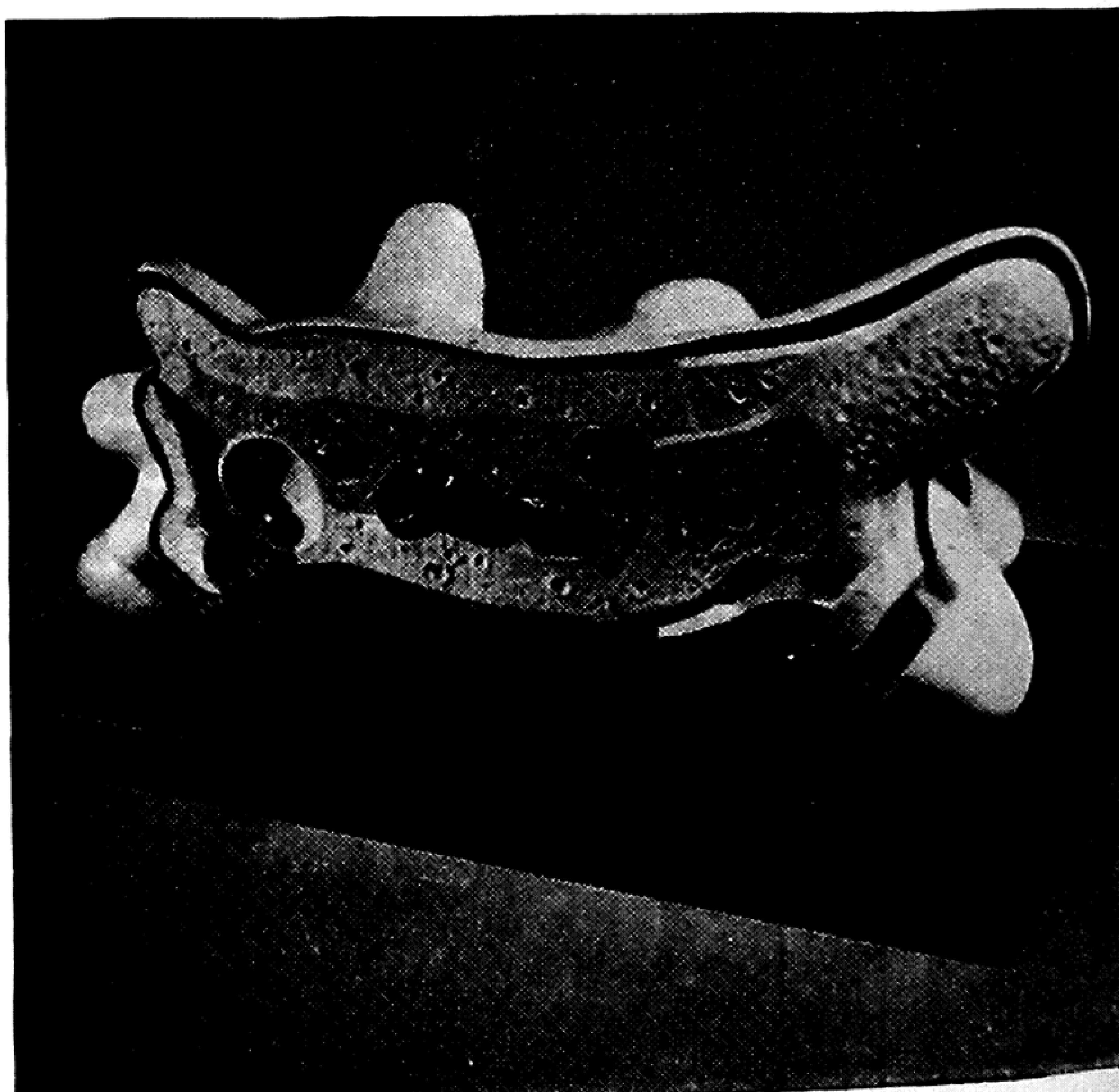
There are three types of models: (1) *solid models* which are used chiefly for external features and recognition; (2) *cross-section models*

Transparent mountings for specimens are a new device. They have both advantages and disadvantages.

Science classes make extensive use of models such as this one of an amoeba. Their teaching value is obvious.

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which reveal internal structure; (3) *working models* which demonstrate function or processes. The first two types are *static*, the third *functioning*. Each has a distinctive contribution to make in teaching. Examples are so numerous that to enumerate them would take up space needlessly.

Often, models are more serviceable than real things. In the first place they may be handled, because they can be constructed of a size and a durability for handling, and they may be used over and over again. Models of some things are firmer and less repulsive than real things. This is particularly true in the realm of anatomy and physiology. Colleges and even medical schools make extensive use of models, although they also work with real objects. It is hardly feasible to have students of the secondary school working with actual body organs of any animal life beyond some of the intermediate forms. Man's ingenuity in constructing models knows no bounds. For example, "glass men" have been constructed which appear almost real; blood-like liquids flow through their glass veins; and the structure can be dismembered part by part for scrutiny and study. Eyes and ears six feet in height have been prepared for science exhibits. Working models of metropolitan city water systems have been reduced to table top dimensions.

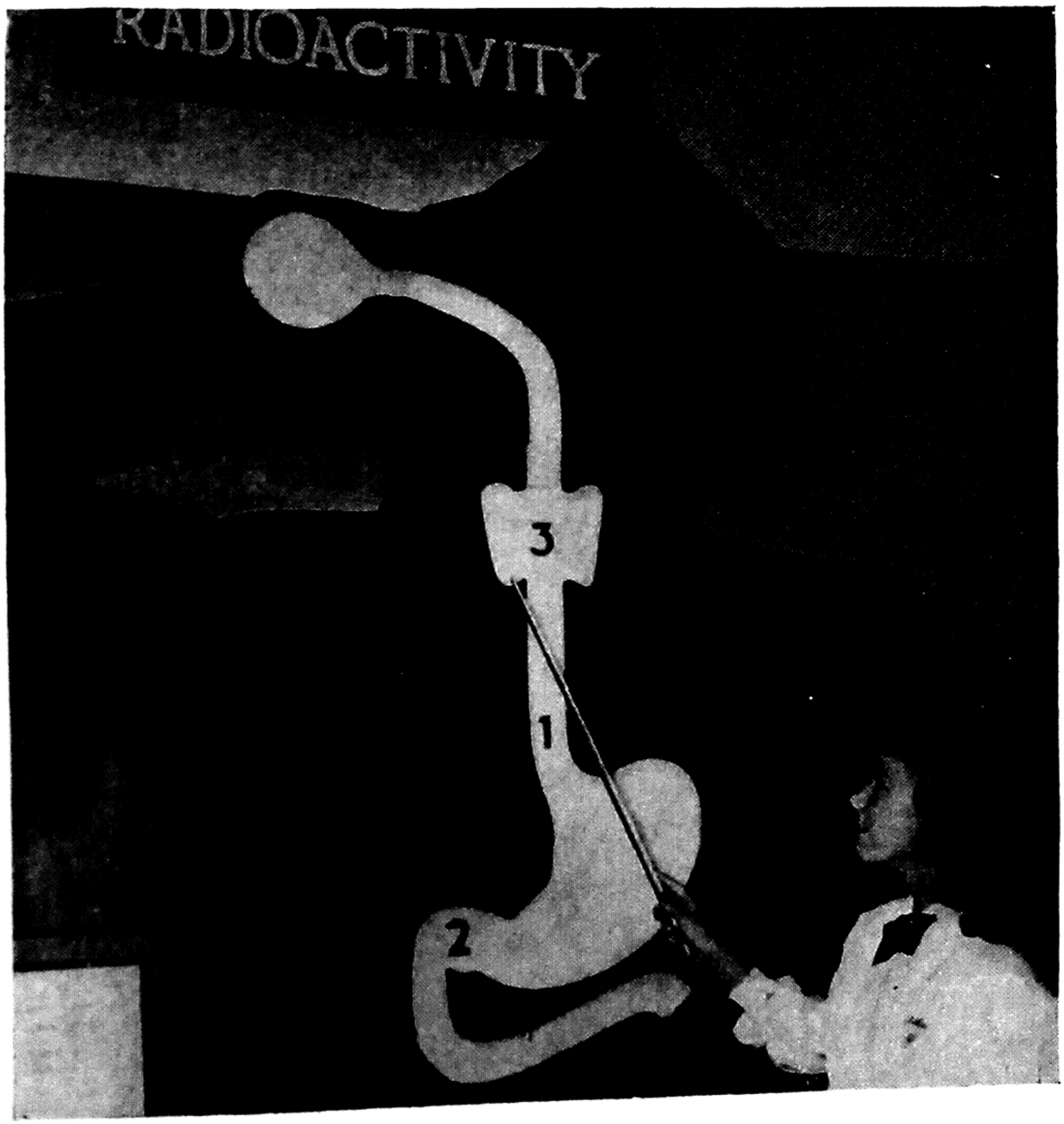
Engineering schools frequently bring actual objects of great size into their shops, objects such as whole airplanes, street cars, and locomotives. The secondary school or the vocational school cannot, in most instances, afford such materials, nor are these real materials always needed. For all types of study except the most advanced, solid, cross-section, and working models, made to scale, show materials, functions, processes, and principles sufficiently well.

The globe is a model, an indispensable one in the teaching of geography, and is better than other known devices to show earth distances and relationships.

There are limitations to models and there are misconceptions to guard against in their use. The teacher must be sure that the student is aware of the element of size—the model may be actual size, enlarged, or reduced. In cases of enlargement and reduction, the student should be given a clear understanding of the amount of size-change which the model represents. There is also danger that the model oversimplifies functions and processes. A model of the human eye in which each part may easily be removed and then replaced, may appear very simple. The student must also understand that this model of the eye is out of its context,

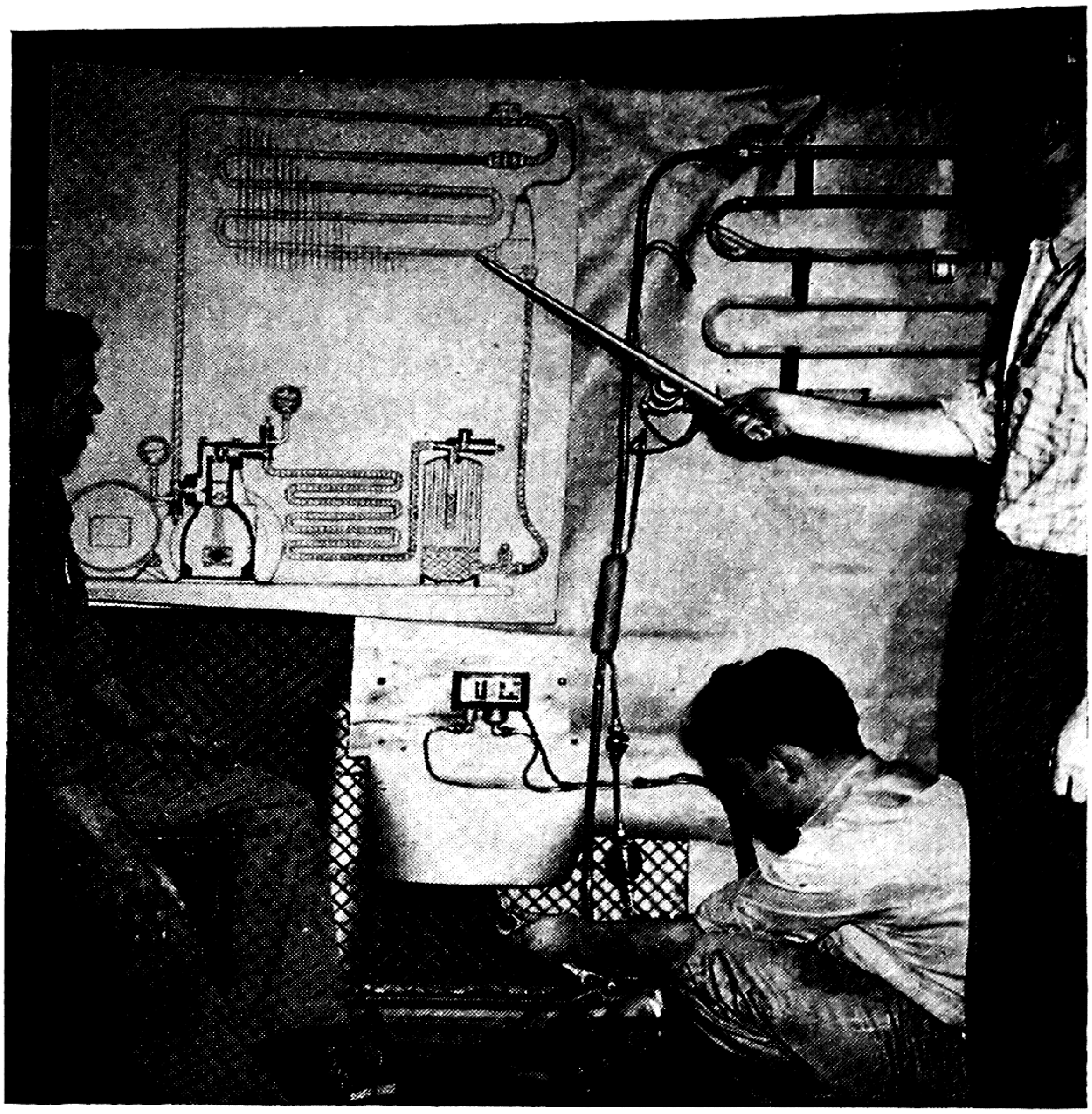
so to speak, because the eye functions as a part of the entire body and is inextricably integrated into the functioning organism. Wherever it is possible, it is well to see the real object so that there can be no doubt about the relationship of the two. This is not difficult in many instances, although it may involve a field trip. A replica of a totem pole presents many possibilities for misunderstanding, but a trip to a museum or city park may show the pupils the real thing. Finally, the teacher must be on the alert to point out that the model may be incomplete in certain respects. This will be noticeably true of models of scenes and processes. A model of a section of the Grand Canyon will show the contour and may give a good picture of the coloring, but it is incomplete in many details like temperature, sun, or sky. Thus, the inevitable conclusion is that models must be taught.

In consideration of the values of models, the benefits gained by actual preparation and production by the students should not be overlooked. Naturally, not all kinds of models can be made by students, but even crude models have their advantages. Dr. B. R. Weimer, Dean of the Faculty and Head of the Biology Department in Bethany College, has had unusual success in teaching students to make biology models. Students having no previous training, supplied with only common tools including



This wooden model was made to inform the public concerning the use of radioactive substances in thyroid and cancer research.

COURTESY OF BUHL PLANETARIUM, PITTSBURGH



Working models and charts are effective in vocational and technical training.

COURTESY OF ATLANTA PUBLIC SCHOOLS

a nail file and ice pick, have under Dean Weimer's direction turned out mounted models of earthworms, grasshoppers, sea anemone, and other specimens that are done with a professional touch. In describing a model of a sea anemone made by one of his students, he says, ". . . . the sea anemone was first cast to its approximate form. The arrangement of the septa are really strips of tin, the gastric filaments are thread, and the tentacles are wire-reinforced plaster of Paris. Again, final painting produces the vividness which identifies all of its parts."[1]

These interesting models call to mind a technique for mounting and preserving specimens, which seems to be quite superior to the older method of pinning specimens to a plaque, or impaling them on rods and nails. The United States Department of Agriculture has developed a method of imbedding small specimens in molten plexiglas, a moderately hard, glossy plastic. Such specimens as feathers, grains, bones, frogs, snakes, and so forth, can be imbedded in a block of transparent plexiglas. The specimen is thereby mounted artistically and practically. It can be handled endlessly without damaging the specimen in any way. If the plexiglas becomes soiled, it is washed. One disadvantage, important in

[1]Weimer, B. R., "Model Making," *See and Hear,* 1: 90–93, April, 1946.

some instances, lies in the fact that the student does not get his hands on the specimen to feel its surface texture.

Model making is, of course, not an activity reserved for advanced, mature students. As every teacher well knows, even quite young children can make acceptable models of simple objects from clay, plasticene, wood, cloth, paper pulp, salt and flour, and other materials. The making of relief maps is among the common activities of many grades.[2]

Any teacher who is skeptical of the value of models, or of the ability of himself or his students to make them, should consult the *Eighteenth Yearbook* of the National Council of Teachers of Mathematics.[3] Although this *Yearbook* deals with multi-sensory aids in general, prominent emphasis is placed on models. Joseph Hilsenrath,[4] in the chapter entitled "Materials for Mathematical Models: Their Selection and Use,"

[2]Teachers of geography will be interested in a booklet entitled, *How to Build Terrain Models,* prepared for the U. S. Office of Education by the U. S. Navy, Office of Research and Inventions, Navexos P-296, U. S. Government Printing Office, Washington, D. C., 1946; same bulletin abstracted, J. W. Studebaker, "Terrain Models," *See and Hear,* 1: 49–54, February, 1946.

[3]*Multi-Sensory Aids in the Teaching of Mathematics, Eighteenth Yearbook* of the National Society of Teachers of Mathematics, Bureau of Publications, Teachers College, Columbia University, New York, 1945.

[4]*Ibid.*, pp. 226–44.

Accurate models reduce the chances of faulty conceptions.

COURTESY OF ATLANTA PUBLIC SCHOOLS



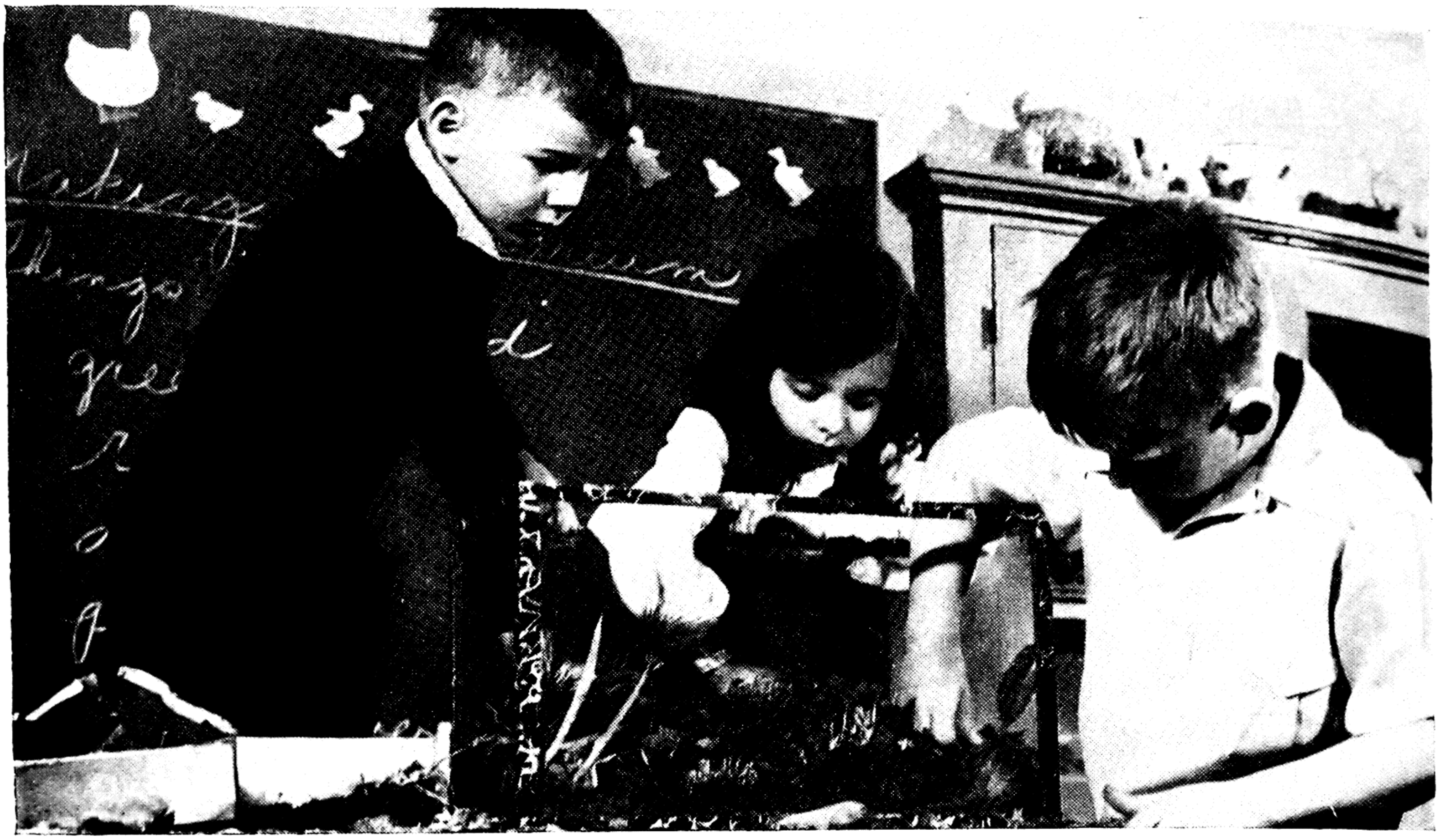
shows how models can be made from toothpicks, wire, cardboard, celluloid, soap, modeling clay, wood blocks, sheet metal strips, brass, aluminum, plastics, and strips of paper. In another chapter Miss Harriet B. Herbert stresses the value of models with pupils who have trouble mastering mathematics. She quotes one such pupil as saying, "Gee, it's interesting when you really see it."[5]

Although schools and industry have used models for a long time, the Army and Navy made an even more intensive use of them during the last war. The multiplicity of three-dimensional training aids staggers the imagination. The pedagogical value of these aids was demonstrated beyond all doubt. They were basic elements in the training of men to use such materials as guns, engines, ships, aircraft, signal devices, barricades, trenches, and docks. Many of these devices were highly realistic.) Models varied in size from miniature airplanes to huge display models of 40 by 250 feet. In addition to models to clarify mechanical operations and theories, the Armed Services made extensive use of panels and layouts. For example, the electrical equipment of a radio or electronic device might be laid out, part by part, on a large board. On this board, condensers, tubes, wiring, resistors, and other parts would be shown in working order. This formed an invaluable apparatus for demonstration and protracted study. The term *bread-board* was applied to such an arrangement.

The Aquarium and Terrarium. Fresh water aquariums are common objects in many elementary school classrooms and high-school biology rooms. The aquarium is a practical arrangement in which to keep small live fish, snails, tadpoles, water-scavenger beetles, and aquatic plant life such as is found along the edges of ponds and streams. With younger children, the aquarium serves as a form of interest involving care of living things, discussions of life, and a means for fostering closer observation of things. At the secondary-school level, the aquarium is an important piece of laboratory equipment in the biology class. Live specimens are available for observation and study. Microscopic slides can be prepared from the spirogyra or other substances in the water. Many forms of microscopic life are always available for laboratory study.

A terrarium is a vivarium without water. It serves a similar purpose to the aquarium. Chief use of the terrarium is found in the elementary

[5] *Ibid.*, p. 252.



COURTESY OF UNITED STATES OFFICE OF EDUCATION

How can you match the interest of these children in their terrarium? Note the correlated vocabulary on the blackboard.

school. It is easily constructed and well adapted to use by primary children.

Values and Uses of the Common Object Materials. Object materials have been found to be valuable teaching aids in every school subject, but especially helpful in geography, nature study, science, manual arts, homemaking, fine arts, agriculture, social studies, and geometry. Specific values lie in the fact that object materials furnish proper and correct images of realities; associations and understandings are deeply fixed in the nervous system; opportunities are provided the pupils for self-initiative in collecting, making, and examining the concrete materials; and in the multiple sensory experiences afforded through handling of materials—direct and detailed examination, experimentation, demonstration, and the simple sensations of color, texture, size, and shape.

There is much value in being able to bring specimens and objects into the classroom for study, yet some things can be more appropriately taught in their natural environment. Botanical and zoological specimens can easily be brought into the classroom, but, even so, it is generally desirable to take the students into the woods and fields to observe materials in their natural habitat. Processes are often much more important than objects,

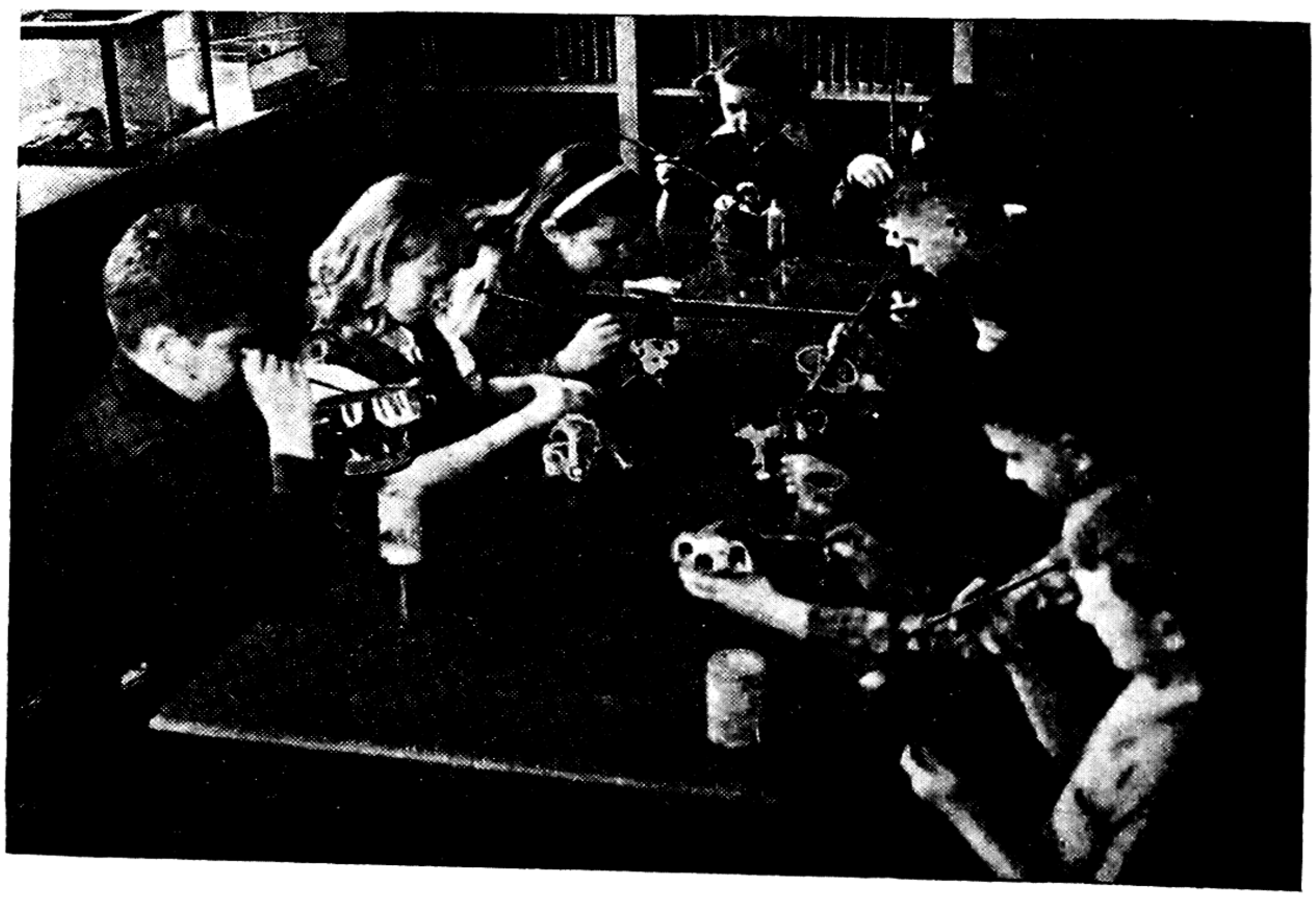
and are most profitably observed firsthand, as in studying industrial plants or the organization and function of city government. Too much stress cannot be placed on the fact that object materials have to be taught. Usually, it is good advice to tell the students what to look for, to direct their observation. It is also good, usually, for the teacher to have some organized means of checking the observations and associations which the students have made. Without preparation for use and follow-up, the student may spend little active mental effort in the looking, or the teacher may confuse apparent pupil interest with learning.

Specimens, objects, and models may be collected by teachers and students, or the more unusual ones may be purchased from a supply house. Wherever it is possible for the class to make or collect its own, values are heightened. Mounting, preserving, classifying, and labeling are concomitant learning activities.

The matter of values not alone for object materials but for all audio-visual aids is summed up by the editor of the journal of the Department of Supervision and Curriculum Development (N.E.A.) who says:

> Motion pictures, radio, transcriptions, filmstrips, lantern slides, *models, mock-ups, simulated training devices,* stereoscopes, posters, photographs, charts, and graphs are the basic physical materials classified as audio-visual instructional tools.
>
> Success in the prewar educational use of these materials and the "proving up" of their values in the armed forces' training experiences clearly indicate that, when properly used by teachers in the light of good pedagogical procedures, they constitute an educational development potentially as significant as the invention of the printing press.[6]

[6] "Proving Up," *Educational Leadership,* 2: 50, November, 1944. Italics by this author.



These pupils are painting their clay models.

COURTESY OF BOULDER, COLORADO, SCHOOL DEPARTMENT

LESS COMMON OBJECT MATERIALS

Under this heading three types of teaching aids will be discussed—*dioramas, mock-ups,* and *synthetic devices.* Although old in general form, they are new in their applications to classroom work.

Diorama. This term comes from the Greek word meaning "to see through." The *Dictionary of Education* defines a diorama as "a three-dimensional representation composed of various symbolic and real materials such as pictures and specimens, and frequently utilizing both transmitted and reflected light to produce a natural scenic effect." To this definition one might add that the pictures or specimens are usually placed in appropriate settings, and that the settings are built up along habitat lines. Thus, a diorama of a coffee plantation might show natives, burros, buildings, coffee plants, tropical vegetation, and similar realia.

The diorama is not unlike the habitat groups seen in museums, except that habitat groups are posed life-size; dioramas are always miniatures. The miniature figures in the diorama are usually made of clay or wax and are painted and dressed to appear very realistic. The figures are placed in a realistic setting, and the entire grouping is usually placed in a boxlike case whose top, ends, and front are made of glass. A small electric bulb in the case illuminates the set. Sometimes it is illuminated only by natural light. The cases vary in size but typical ones are about 10 by 10 by 18 inches. Such a case is easily handled and can be placed on a desk or window ledge. Since the diorama is three-dimensional and is enclosed in a rectangular case, it gives the illusion of depth and reality.

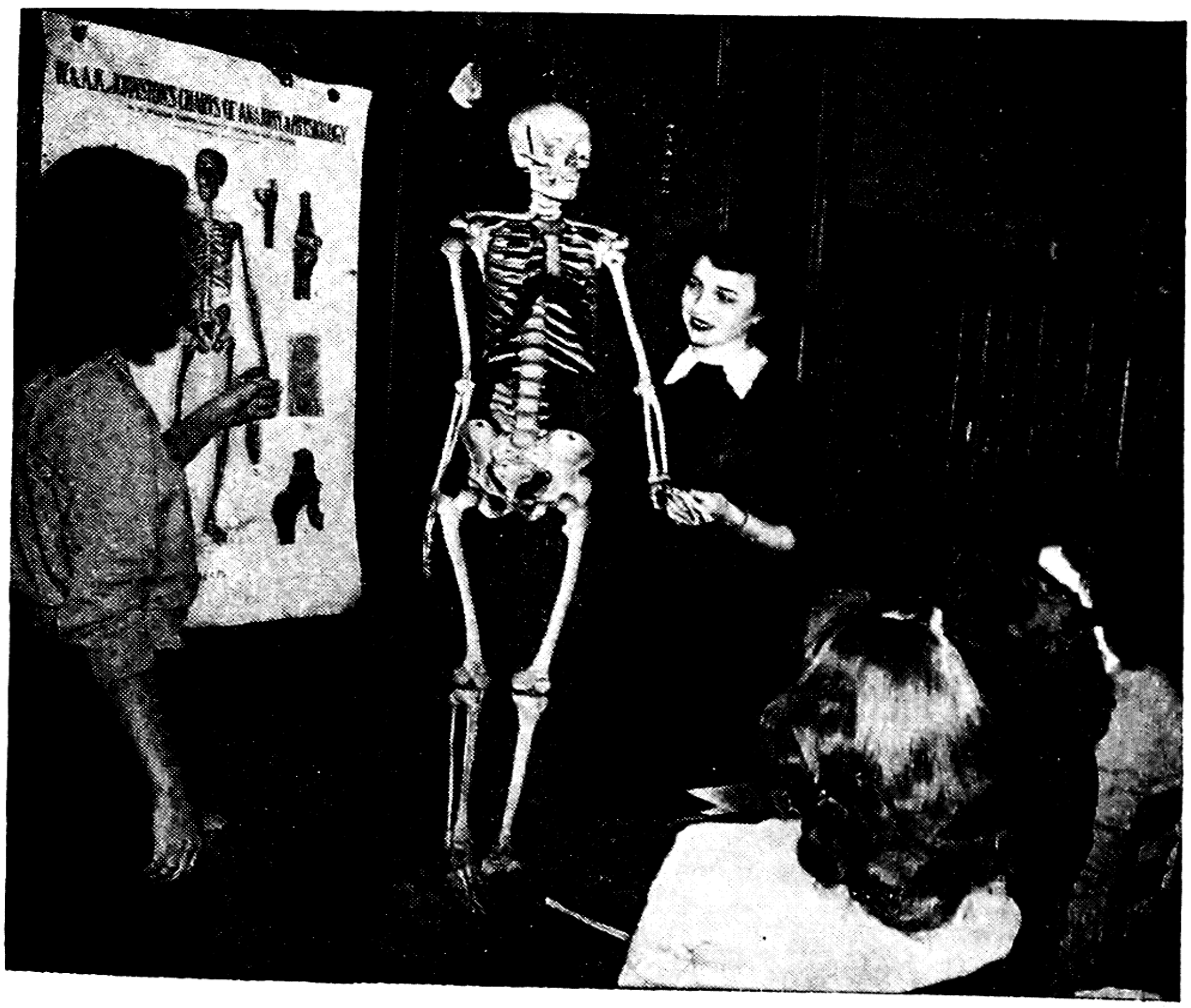
Dioramas should not be confused with Punch and Judy Shows or cardboard sets. The figures of the diorama are usually carefully wrought, and give a distinct illusion of reality. Any scene, landscape, historical event, ceremony (ancient or modern), story, group of people, or fictional incident is good content material. Some excellent dioramas which are now available are a colonial saw mill, General Wolfe before the Quebec embattlements, Chief Cornplanter in an Indian Village, a scene from *Little Red Riding Hood,* and a king knighting a squire. These materials are relatively inexpensive. They seem to have been begun by the museums but are now available commercially. They are easy to construct.

So far as can be learned, no evaluations have been made of the educational value of the diorama. In terms of interest for students, young or old,

they rank high. It is undoubtedly safe to say that they, like all other audio-visual materials, are useful aids, but their use in learning units must be planned. It is conceivable that interesting and meaningful units of work can be organized around the diorama.

Mock-ups and Synthetic Devices. These terms as applied to education came into vogue during World War II in the training programs of the Armed Services. In the period from 1940 to 1945 the Armed Services increased their personnel from less than one-half million to approximately thirteen millions. These men and women found jobs and work in the Army, Air Forces, Marines, and Navy for which they had had no, or very little, previous training. In order to train these men and women efficiently in new jobs and in so short a time, the Armed Services set up elaborate training programs under the direction of the best educational and psychological experts in the country. These men were given every type of equipment they considered helpful in accomplishing their goals. They branched out into new and unheard of methodology to help attain these goals. Their ingenuity in devising teaching and learning aids stands out among the unique accomplishments of this period.

The Armed Services used every teaching device and aid extant. Real objects, models, and mock-ups were given unusual emphasis. Actual objects, such as airplanes, tanks, and battleships were not always available at all times in the training program, nor were these realities necessary in



The real object supplemented with other teaching aids adds up to efficient teaching.

COURTESY OF ATLANTA PUBLIC SCHOOLS

certain stages of the training. Furthermore, naval training stations were established at such inland locations as Kansas and Arizona. Battleships for students in these training centers were obviously out of the question. In the early training stages, models and mock-ups replaced real objects quite generally.

A *mock-up* is defined as a mechanical object or device used as an aid in teaching, and *synthetic device* is a term used for "substitutes for operational equipment." Thus, the two terms seem to apply to the same sort of equipment. A Link Trainer, for instance, may be called either a mock-up or a synthetic training device. The Air Forces used these aids (1) to demonstrate scientific principles, (2) to demonstrate the operation of systems, (3) to develop manipulative skills and maintenance procedures, (4) to teach the assembly and disassembly of units, (5) to teach proper trouble-shooting procedures, and (6) to test the student on any of the above.

The manner in which the mock-ups were used can best be told in the words of those responsible for their use.

> The teaching procedure generally employed is as follows: Normally, classes are organized into instructional groups with a low ratio of students to instructor. Where it is impossible to provide enough instructors to maintain as low a ratio as desired, advanced or more capable students are utilized as assistant instructors. The instructor presents a short explanatory introduction to the day's lesson, using selected visual aids. Project or exercise sheets, or student workbooks are issued to the students to be used as guides when performing the projects. These give information on the subject, tell the student *what* to do, and tell what *results* are to be expected. This material represents one of the most important features of Army Air Forces training. The student's exercise sheets serve to keep him on the right track as he works with the equipment. Knowing what results to expect, he is better able to recognize them.
>
> The instructor arranges the mock-up or the several mock-ups on the project from the simple to the complex. He then demonstrates, on the mock-ups, the principles, operations, procedures, etc., which are involved in the project assigned to the students.
>
> The students perform their projects on the same mock-up used by the instructor in his demonstration, or on similar mock-ups. The students, using their project sheets, progress from simple jobs to complex jobs. Notice that the students, at all times, know the results which they should experience. These simple jobs are repeated as often as necessary until the students master them within the time limits allowed. Informal discussions and ques-

tioning between instructor and students are carried on freely, thus eliminating the necessity for formal lectures.

A final complex mock-up, which combines the simpler mock-ups into one, serves as the equipment on which the practical examination over the entire project is given. Here the students, individually, must perform the projects given them by the instructor. The instructor does not indicate the results to be achieved, nor the procedure to be followed. The student will be able to do this project if he has mastered the simpler projects which preceded it. His project grade is determined by his degree of success in demonstrating the principles, operations, procedures, and manipulative skills involved in the combined project.[7]

Brief mention is made in the above quotation of the instructor's use of selected visual aids. The whole scheme of Army Air Forces' teaching involved a wide use of all sorts of aids integrated into the program. Each instructor was given a syllabus which contained such information as text references, visual aids, outlines of instruction, mock-ups and synthetic devices, and assignments. Students' workbooks were divided into five sections for each project: (1) reasons for studying a particular lesson,

[7] *Use of Training Aids in the Armed Services.* Some Implications for Civilian Education, Bulletin 1945, No. 9, U. S. Office of Education, 1945. Washington, D. C.



This elementary science classroom is equipped with a variety of teaching aids. Try counting them. Science concepts are meaningful when they are acquired under these conditions.

COURTESY OF THE NEW ALBANY, INDIANA, PUBLIC SCHOOLS

(2) facts the student should learn, (3) general information on the material, (4) specific information on the material, and (5) work that is to be accomplished. Each instructor was given a handbook in addition to his syllabus. This handbook was divided into: the objectives to be achieved, training units to be used, concise outline of material to be presented, points to be covered in the summary of the lesson, assignment for students, and drill sheets. These handbooks are analogous to lesson plans. By these methods, uniformity of content coverage and time allotment were assured. All instructors were carefully supervised and were kept constantly on the alert by demonstrations, clinics, and additional group and individual instruction. Instructor-proficiency was noted by frequent observation, by appropriate practical and written tests, and by observing the proficiency of the students taught.

It is interesting to note the suggestions of the evaluation commission as to how some of these special Air Forces devices might be used in high school, vocational school, or college classes.

1. Trainer, Demonstrator, Type Q-2 (Army Air Forces Training Aids Catalog)—A globe of transparent plastic which would be of use in mathematics, geography, astronomy, navigation, and other scientific demonstration.
2. Trainer, Mock-Up, Type O-37 (Army Air Forces Training Aids Catalog)—A time and date panel illustrating the functions of the international date line. Good for use in geography and science survey courses.
3. Trainer, Mock-Up, Type O-47 (Army Air Forces Training Aids Catalog)—A three-dimensional, diagrammatic device enabling students to visualize the various typical cyclonic and frontal air mass conditions represented by a weather map. This device would be useful in any instruction in meteorology and at various grade levels where modern weather theory is taught.[8]

The whole program has been given prominent space in the discussion of audio-visual aids at this time because of the general findings and recommendations of the evaluation committee. The committee says:

> The problem of creating realism in the learning situation has not been overlooked in civilian programs. However, this Committee believes that the experience of the Services in the use of devices, especially the so-called "synthetic" devices, has definite value for professional, technical, and vocational education. Moreover, it believes that the principles involved may have valuable implications for other types and levels of education.[9]

[8] *Ibid.*, p. 23.
[9] *Ibid.*, p. 17.

MANIPULATIVE EXPERIENCES

Indirectly, much of the use of representations and object materials falls into the category of manipulation. No discussion of this sort would be complete unless it directed attention to the use of building blocks and art materials in the lower grades. Manipulative activities are truly important, and are the rudimentary visual materials upon which many of the more complex materials rest.

Kindergarten and primary children have to begin building up cumulative experiences for their later educational development. Montessori, Hill, and many others made systematic studies of the values, uses, and types of materials for primary children. Blocks are among the earliest and simplest visual materials used. They range from the small colored letter type to the large building and mechanical blocks; from unpainted to decorated pattern type blocks.

Many values can be seen for small children in the use of these blocks, values such as the development of imagination, co-ordination of muscles, the insight to make observations, the quality of leadership and initiative, and the ability to work with other children. As the child, by himself or in co-operation with other children of his own age, begins piling blocks together, he soon learns to evaluate his product. If it does not meet the approval of his critical eye, he tears it down and begins over again; he thinks and plans as the structure takes shape. Classmates inquire what it represents, and, as he justifies his construction, he evaluates.

As the child works with blocks, he also begins to mold clay, to use large



Projects such as this one teach co-operative planning, manipulation, harmony of color, and arrangement.

COURTESY OF ST. LOUIS PUBLIC SCHOOLS

crayons, brush and easel, and soon hammer and wood saw. These activities progress to paper cutting and the use of pencils, water colors, charcoal, small brushes, screw drivers, pliers, and more complicated tools and equipment. The development is from the purely manipulative toward the symbolical, from simple observation toward the development of concepts.

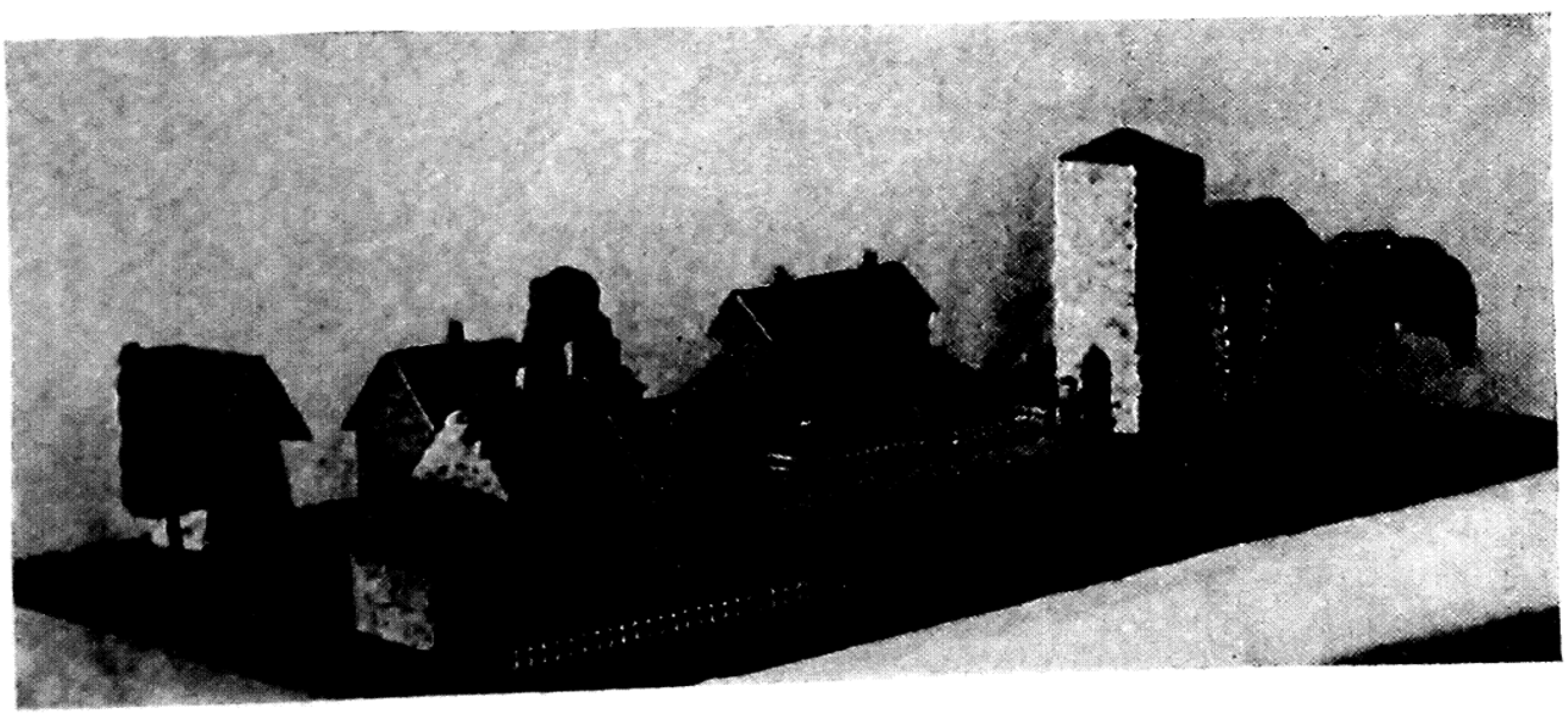
TABLE, FLOOR, AND ROOM REPRESENTATIONS

These representations of real objects might have been discussed under models, but because of their simplicity they are treated separately. Table, floor, and room representations are much alike except for size and symbolical character.

Table Representations. In the elementary grades many problems with extended ramifications are worked out on a table top. Building blocks are manipulated to represent a village, an important street intersection, or even a city. Toys and miniatures complete the complement of the representation. Learning situations of various kinds can be discussed and evaluated. Relationships are easily shown and concepts clarified.

A sand table or box is an indispensable part of the equipment of the lower grades. Its possibilities are many and varied. It enhances learning in projects in history, geography, safety, nature study, and other areas of learning. It provides excellent opportunities for the children to do their own planning and to develop initiative and co-operation. Representations may be crude or refined depending upon the purpose of the project, skill of the children, and amount of help from the teacher. The teacher should be alert to guard against the children's getting misconceptions of size or distance.

Another caution is necessitated by the fact that sand construction is easily disarranged or destroyed. A careless janitor or an enthusiastc child may bump the table and disarrange the whole project. More permanent substances than sand, such as papier-mâché, salt and flour, or clay will



This model village was made from cork scraps. The church tower is 5½" high.

COURTESY OF BANTAM WORKSHOP, CAMBRIDGE, MASS.



COURTESY OF HOUSTON, TEXAS, SCHOOL DEPARTMENT

A fourth-grade class lives its study of a Pueblo Indian village.

eliminate fragility, but these substances are less flexible in their utilization.

Most of the work with sand tables or boxes at school does not go beyond the lower elementary grades, but it should be pointed out that the Armed Services used the sand table representation most advantageously in their training programs. Dameron quotes a Marine training aids officer as saying that the sand table "has been of great value in showing personnel the 'why' of military operations as well as the 'how.'"[10] The naval training centers used this same device to help personnel visualize harbors, coast outline, atoll formations, ocean floors, and obstructions. Both the sand table and the terrain model were widely used by all the Services.

The versatility of the sand table is unquestioned. It can serve for either free play for the nursery school child, or for the concrete study of form, size, or relationships in the high school, college, university, professional schools, Armed Services training centers, and other training centers.

Floor and Room Representations. Many teachers who have worked with table representations feel that a more comprehensive understanding of relationships can be given children if larger representations are used. Some children find difficulty in projecting the table representation with its

[10] Dameron, Vernon G., "Wanted: A Broad Concept of Audio-Visual Instruction," *Educational Leadership*, 3: 140, December, 1945.

toys and miniatures to real situations. A skillful teacher who has a classroom with movable furniture can move chairs and tables, and outline projects on the floor of the room. These projects may be concerned with maps, coal mines, farms, water systems, or what not. Children are attracted to these activities and are untiring in their efforts to develop them.

THE MUSEUM

You can't learn anything without experiencing it. Of course, words are an experience but unless they are backed by a real, substantial, concrete happening they are not very enlightening. To the groping human mind there is nothing so reassuring, so illuminating as THINGS.

Things gladden our eyes. Did you ever sit listening to a lecture about a foreign people, prodding yourself into attention and wishing that each sheet of notes was the last—sinking into gloomy resignation each time you discovered it wasn't?

And then, did you ever have the stimulating, joyous, uplifting experience of an interruption by an assistant who trundled a trayful of things to the platform and displayed them while the lecturer, now a benefactor of mankind, told little stories about each bit?

This is the hat the man wears when he goes hunting. This is the shoe the woman makes before the tent of an evening. This is the bowl she bakes the beans in and this is the spoon she stirs them with. Here's the baby's cradle and here's the little pot his mother heats the milk in when he cries at night.

This lovely jar is a bit of their art pottery. This stone shows how they kept their records. You see they made pictures of the things they liked and so told their story. This is the picture of the tomb of their king. That strange figure on the right is the emblem of their god.

Now you feel you know something about the subject the lecturer wanted to teach you. You would never have gotten it had it not been for the things. And after the lecture didn't you go up with the rest of the crowd and take as many of the things into your hands as you could? Didn't you feel better after you had felt them and weighed them and turned them around and around to see all sides of them? Of course you did, for we are made that way. We must see and hear and feel in order to know.

School is too often a place where you hear a whole lot, see a very little and feel almost not at all. Yet it is through our hands that we have pulled ourselves up to the present level of growth. Eyes and ears are not nearly enough, and words alone are too empty to be of any value. There must be THINGS.—Angelo Patri.

The Public Museum. *Time Magazine* has estimated that the average American goes to a museum (all types) on an average of once in five years. Millions of dollars are invested in public museum buildings and collections. In the main these buildings are cold, formidable, marble structures, studded with uniformed guards and with the specimens and collections locked or bolted in glass cases. The collections are, therefore, merely on exhibit, and any education growing out of the museum is "education by exposure." The materials are not to be touched, hence the educational value is limited to simple, silent contemplation. This condition has led one educator to remark that of the one thousand museums in the United States, nine hundred are dead. Museums are located in principal cities, or centers of wealth, which is quite a contrast to Europe where there are museums in the principal cities but, in addition, nearly every community of any size has its own museum or collection.

A new philosophy has been emerging in the last decade, and many museum directors are interested in making their institutions friendly, useful, and enjoyable educational centers—educational in deed as well as in name. This new philosophy holds that museums which are worth while are museums for use. The general acceptance of this new philosophy is handicapped by tradition and the fact that museum boards are reluctant to allocate any considerable portion of their funds for instructional purposes. According to Adam one of our largest and most enlightened museums asked for an additional endowment of ten million dollars, the income to be divided as follows: study, research, and publication, 47 per cent; administration, operation, and maintenance, 23 per cent; exhibition and preparation, 14 per cent; *educational purposes,* 13 per cent; and field work 3 per cent.[11]

Museums seem to have two main channels by which they can serve the schools and students—by bringing students to the museum, and by sending museum materials to the schools. Only the first of these is functioning to any marked extent. School visits to the museums are common, yet they can scarcely be called effective as a medium of instruction. In the main, the visiting of museums by classes is limited to the elementary school. When the students arrive they are guided through the exhibits by a museum docent, who may also lecture on some part of the exhibit. Often the groups are too large to permit questions or group discussion,

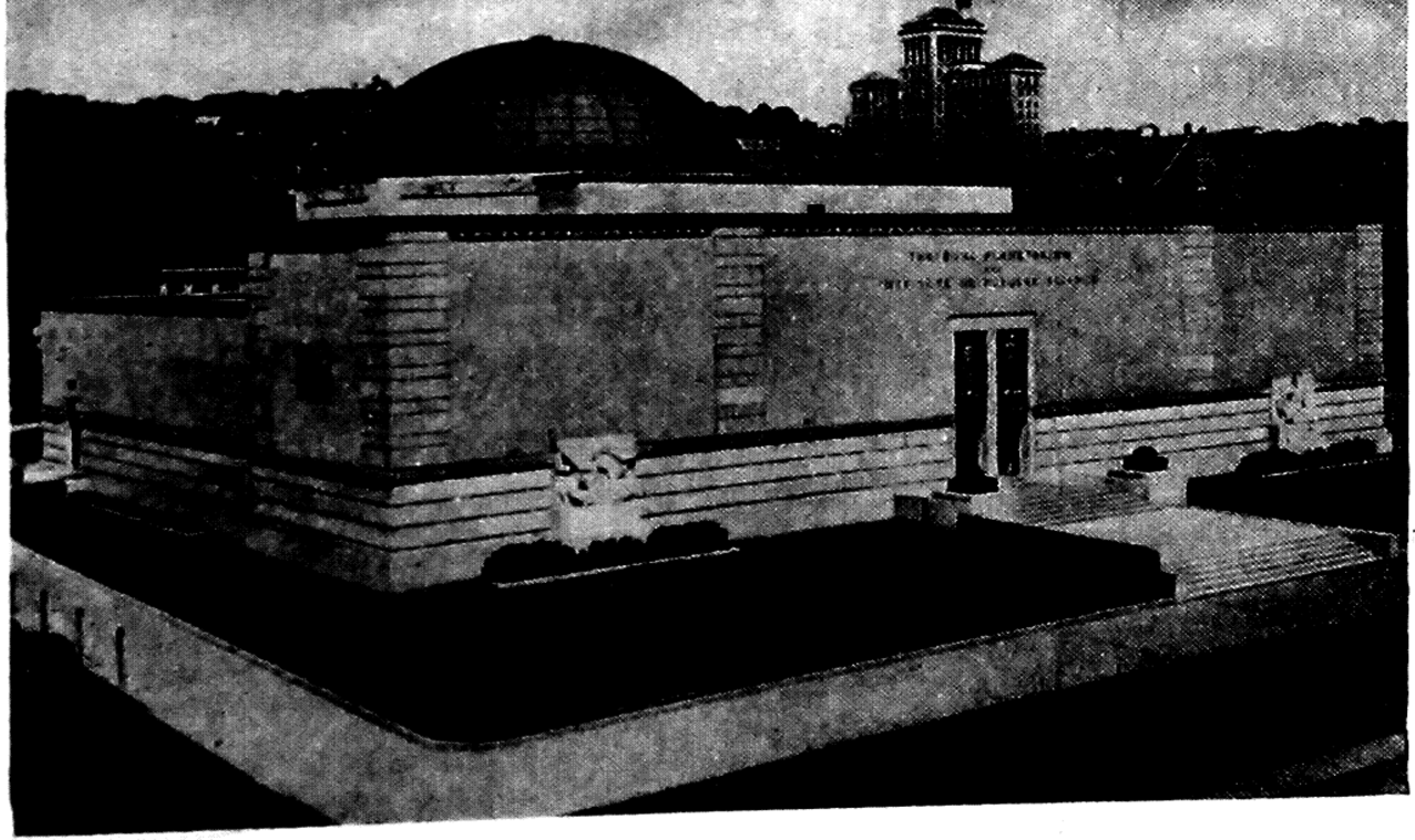
[11]Adam, T. R., *The Civic Value of Museums,* p. 6, American Association for Adult Education, New York, 1937.

and at best pupils do not get an opportunity to make such visits more than once a year. A few museums have made arrangements for pupils to come voluntarily to the building after school hours for club work involving storytelling, hobby pursuits, or various types of entertainment. Many of the teachers in the schools have had no preparation in efficient ways of using the museums; consequently, when their children go on a visit to the museum, they go unprepared, and there is no follow-up of the trip with leading educational activities. To help counteract this, some museums have instituted courses for teachers. Obviously, only the large, well-equipped museums are staffed to give this service, and even the large museums are not certain that such a service is within their scope of activities.

Museums have shown little disposition to send materials and lecturers to the schools, yet where such a procedure has been tried, success has been noticeable.

To see what could be done to correct this desultory and irregular relationship between the schools and the public museums, the General Education Board financed a school-museum project organized around five museums for a period of three years with a subsidy of nineteen thousand dollars to each museum to carry out the project. The five museums selected for the project were the Albright Art Gallery in Buffalo, the Chicago Art Institute, the Cleveland Museum of Art, the Milwaukee Art Institute, and the Museum of Modern Art in New York.

The project as carried out by the five art museums in co-operation with the school authorities probed such matters as teacher preparation in using museum materials, qualifications for museum staff members, the values of school-owned museums, techniques for successful utilization of museum



Planetariums are popular for school trips, and their educational activities always attract a large voluntary juvenile attendance.

COURTESY OF THE BUHL PLANETARIUM, PITTSBURGH

materials when pupils visit museums, lecture-demonstration-discussion techniques, problems involved in transporting museum materials to schools, types of materials of most interest to students, value of teacher-pupil planning committees, and public relations.

Quite naturally a project of such proportions brought out many interesting and significant potentialities for a closer co-operation between schools and museums. Five conclusions stand out: (1) both schools and museums are genuinely interested in promoting a closer relationship and understanding; (2) museums offer great quantities of visual materials which are available to the schools at little cost; (3) among children of foreign parentage, in low income levels, a respect for the art and culture of their native lands is easily cultivated, and standards of living and cultural tastes can be raised; (4) familiarity with curriculum, school routine, and viewpoints of teachers on the part of the museum staff is necessary for successful collaboration; and (5) schools need better physical facilities for housing, exhibiting, and utilizing museum materials.

It was the opinion of museum officials who worked on the project that in the future there will be a marked increase in the use of museum facilities by schools, and that the museums now recognize the value of their educational function and will work more closely with schools.

The School Museum. Many educators feel that every school should have its own museum. These museums can be begun by teachers and pupils collecting objects, specimens, and models of permanent value, or they can be started more ambitiously by allocating school funds for initial outlays. Although a great many environmental materials can be had at little or no cost, if the museum tries to go beyond what its immediate vicinity can furnish, it will have to fall back on gifts, loans, and purchases. No matter how the museum is begun, the collection of specimens should be orderly and systematic, and each specimen should have a definite relation to the curriculum. Library books are ordered systematically so that acquisitions are functional. A library of miscellaneous odds-and-ends would be of little value. Similar principles of selection of specimens should apply to the museum. A collection of curios has little value.

Types of School Museums. School museums may be classified in numerous ways, but a simple, functional classification is in terms of the group or unit served. Thus, there are three types of school museums—room, building, and district.

Room museums are the simplest of all types. They serve one class of pupils or the pupils of one teacher, or are organized under the direction of the particular room-teacher, and they generally have a specific function to serve. A teacher or a class, or both, become interested in starting a collection of stones, grains, woods, metals, ores, or other objects because such a collection is associated with a problem which the children are studying. As other problems are studied, the collection is expanded. The class now has a simple museum. It may become static or it may grow, depending upon many factors.

Teacher and class should decide in advance what the ultimate size and purpose of their museum will be. They should draw up criteria to help them make decisions in connection with their collection. Here are a few principles which are educationally sound:

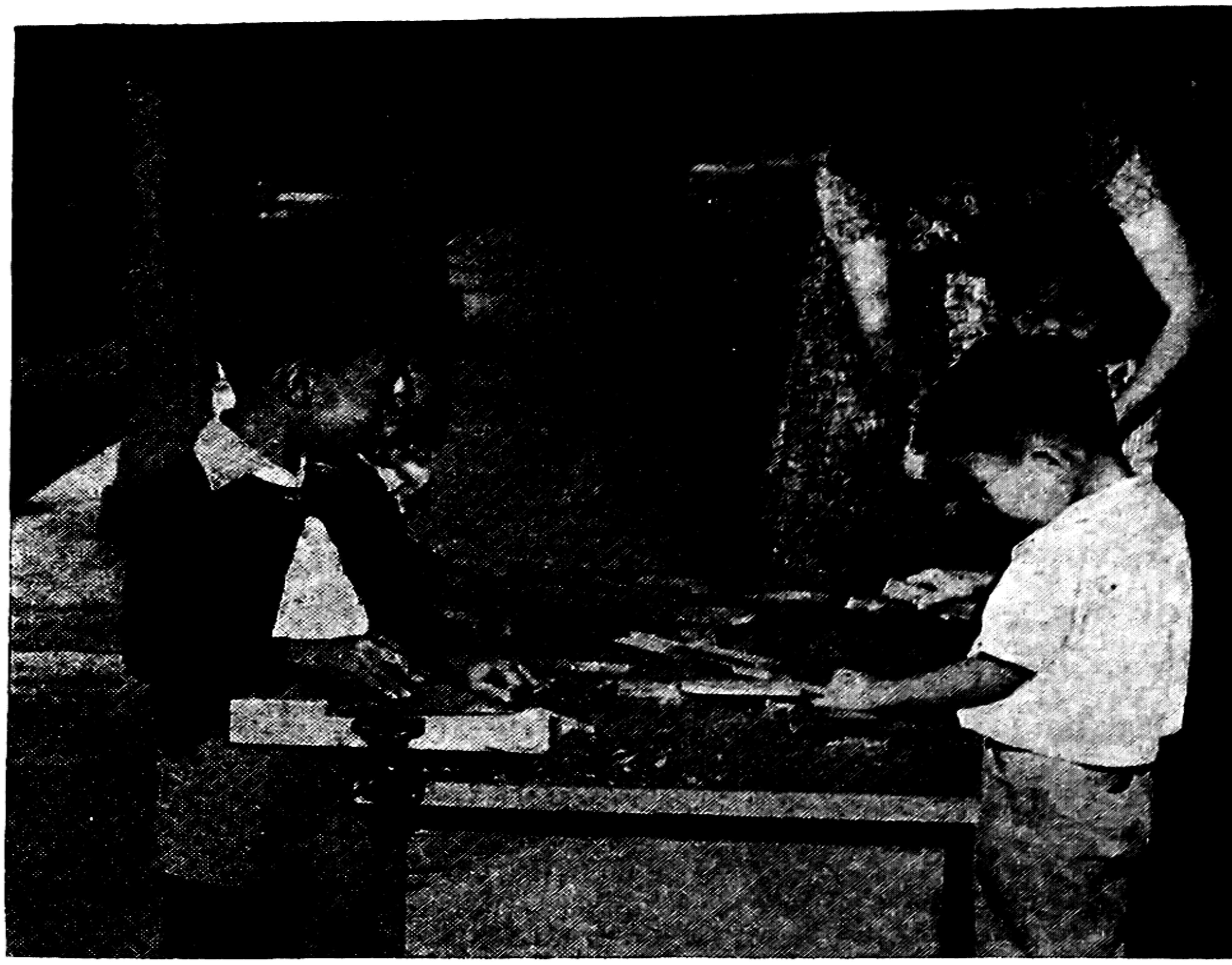
1. Do not try to get too many specimens. A big collection is not always a good collection.
2. Avoid duplicates. The collection of duplicates is excusable only if they can be exchanged with other room collections for items not already possessed.
3. As far as possible the specimens should be of a fairly uniform size. This makes the collection more orderly, neater, and easier to house.
4. Find a place to house the collection. Shelves, bookcases, or display cases are satisfactory. In the beginning the collection may be kept on a table, but only temporarily.
5. Decide on an orderly manner of labeling all specimens. This is a "must." Labels should be concise; they may give name of object, locale, and sometimes a few words of explanation. Labels should be legible, firmly attached, neat, and finally covered with shellac or transparent tape.
6. Continuous care is necessary to keep the collection neat, clean, and useable.

Building museums are simply expanded room museums, but large enough and varied enough to serve all of the teachers and pupils of the entire building.

School district museums are large collections designed to serve the entire district. Such a museum is centrally housed and does not stress the public museum function of display; in fact it may not cater to visitors

If practice makes perfect, these children will attain perfection early.

COURTESY OF HAWAII DEPARTMENT OF PUBLIC INSTRUCTION



at all. It becomes a collection center for all the schools of the district and in turn distributes the materials on loan to various schools or teachers on request. Several large cities which maintain educational museums tie them in with a complete center of audio-visual materials. Such a museum or center amasses great quantities of recordings, lantern slides, films, models, specimens, art collections, photographs, and similar materials. Each school building then becomes a substation of the centralized museum. Collections may be permanently allocated to buildings or they may be rotated periodically, depending upon their utilization, scarcity, and other conditions. A centralized system requires a staff large enough to classify materials, issue lists or catalogs, provide transportation, take care of requisitions, repair and recondition materials, and provide other services.

A large number of cities have special departments of audio-visual aids, and a few cities have sizeable educational museums as a major section of the visual aids department. A fuller and more complete use of the materials seems evident under this arrangement. Duplication is eliminated and funds seem to be more advantageously spent.

School museums, regardless of type, usually do not have the funds to purchase expensive materials. For this and for other reasons schools should maintain co-operative working relations with public museums. Both the school and the public museum have a function to perform, and their work is complementary. The facilities of the public museum are usually much greater than those of the school museum. For example,

the former purchases original art objects, whereas the latter is likely to purchase reproductions and copies.

Special Problems in Connection with Museums. School museums must not make the mistake of aping the public museums by gathering big and expensive collections, by putting them under glass, and then sitting by and waiting for people to come to view them. The purpose of the museum is to make learning more vital, functional, realistic, and interesting. These purposes are served by contact with concrete materials under the direction of qualified teachers.

Museums in schools present problems, some of which have already been mentioned. Here are some others.

1. *Housing.* Adequate facilities for housing and exhibiting collections and large museum groupings are lacking in most schools. Architects have given little attention to this aspect of the functional arrangement of schools. Most classrooms have little space for shelving or storing materials other than those actually being used at the moment. Again, few buildings have sufficient space to allow a special room to be set aside as a museum. School architecture is constantly developing. School buildings for tomorrow not only call for such special facilities as lockers, cafeterias and libraries, but rooms equipped for motion-picture projection, radio utilization, and provisions for housing and exhibiting works of art and museum collections.

Exhibition space is also limited. Corridors are not too satisfactory, for many reasons—they may be crowded, poorly lighted, or students may not be permitted to linger for more than a cursory glance at exhibits. Squeezing exhibition space into a building not properly planned is difficult. Such space needs to be planned as an integral part of the structure. There should be a separate room or a large alcove, open to classes and visitors, and not located in attic or basement. It should be well-lighted and equipped to house all types of exhibits; large and small, flat and three-dimensional; on walls, tables, and in showcases. Classrooms should be equipped with secondary or supplementary exhibit facilities. Materials exhibited should be at a level to permit easy inspection by all students. Good lighting and unobstructed viewing are essential.

2. *School Schedules.* Secondary-school schedules are much more rigid than those of the elementary school, and as such tend to prevent classes from making visits to museums. Therefore, it is imperative that the

materials be brought to the schools. Attention needs to be given to scheduling and administrative arrangements so that high-school classes in particular can make greater use of museums.

3. *Teacher Training.* Little attention is given to the use of object materials and representations in the preparation of teachers. Science teachers are given training in how to use a physical laboratory, but other teachers know little about their laboratory materials and the techniques of utilization. This aspect of the teacher's preparation is now being given as a part of the in-service training in many cities.

4. *Sources of Materials.* In addition to organizing collections to be drawn from the community, teachers need to know where and how they can get from other parts of the country such things as industrial products, raw materials, or art objects.

EXHIBITS AND EXHIBITIONS

School exhibits serve to acquaint the public with the work of the schools, to familiarize the student body with work done in certain departments, and to apprise the student body of important activities of the school and the community. Museum materials of a permanent nature may be on exhibit continuously, but the changing exhibit, and special exhibit, are more stimulating both to the students who prepare them and to those who view them. Few city school districts can afford a large and significant art exhibit in every school building. A small collection can serve many schools if it is rotated periodically. Students are eager for each new exhibit to arrive.

Special school exhibits are usually arranged for such events as "open house," PTA meetings or conventions, and other special events at the school. Attractive corridor exhibits arranged to coincide with school plays, recitals, and programs are to the advantage of the school. Both before and after the programs, people will loiter in the halls and take a short time to see the exhibits, particularly work done by students. Nothing is gained, however, by putting up exhibits to coincide with basketball games. The crowd simply will not stop to consider exhibits.

School exhibits need not be confined to school buildings. It may often be good policy to exhibit school work in strategic places other than the schools. Suitable exhibit locations are fairs, shop windows, convention or grange halls, and other public places. The best answer to the question of where to exhibit is found in the purpose.

Principles of Exhibiting. Effective school exhibits follow principles of good advertising. The object of the exhibit is to create good will, to show the work of pupils, to get attention, or to sell an idea. The following principles will help make the exhibit a success: (1) Build around a central theme so as to achieve unity. (2) Make the exhibit dramatic. (3) Use color. (4) Be bold. (5) Use plenty of posters and signs. (6) Don't crowd—space is important. (7) Use specimens, models, etc., but remember that the school work of the pupils should be the basic part of the exhibit. (8) If certain parts of the exhibit can be planned so that pupils will be working, the attention of the audience is assured. Pupils may be modeling with clay, sketching, painting, cutting recordings on the radio recorder, making puppets, preparing lantern slides, carving soap, or finger painting. (9) Attention will also be drawn to exhibits or collections which have moving parts, as in models. (10) Everything should be neatly labeled so that it is self-explanatory. (11) Don't use out-of-date or nonseasonal materials, soiled materials, nor broken down models. (12) Try to have every pupil in the school represented in the exhibit in some way. Exhibits of class group-work will enable even the clumsiest child to feel that he can contribute. His parents will be looking for his work. (13) Use pupils' names wherever their work is concerned. (14) Give the pupils a significant part in the planning and execution of the project. (15)

Classroom exhibits are possible in every school. Note the various objects in this one.

COURTESY OF ATLANTA PUBLIC SCHOOLS



Publicize the event. (16) *Be sure that the exhibit illustrates good educational procedure. It must be more than just a show.* (17) In a day or two after the exhibit closes the teachers should discuss it with their students. Such an excellent opportunity to evaluate their own work and to consider ways and means for future exhibits should not be allowed to pass unnoticed.

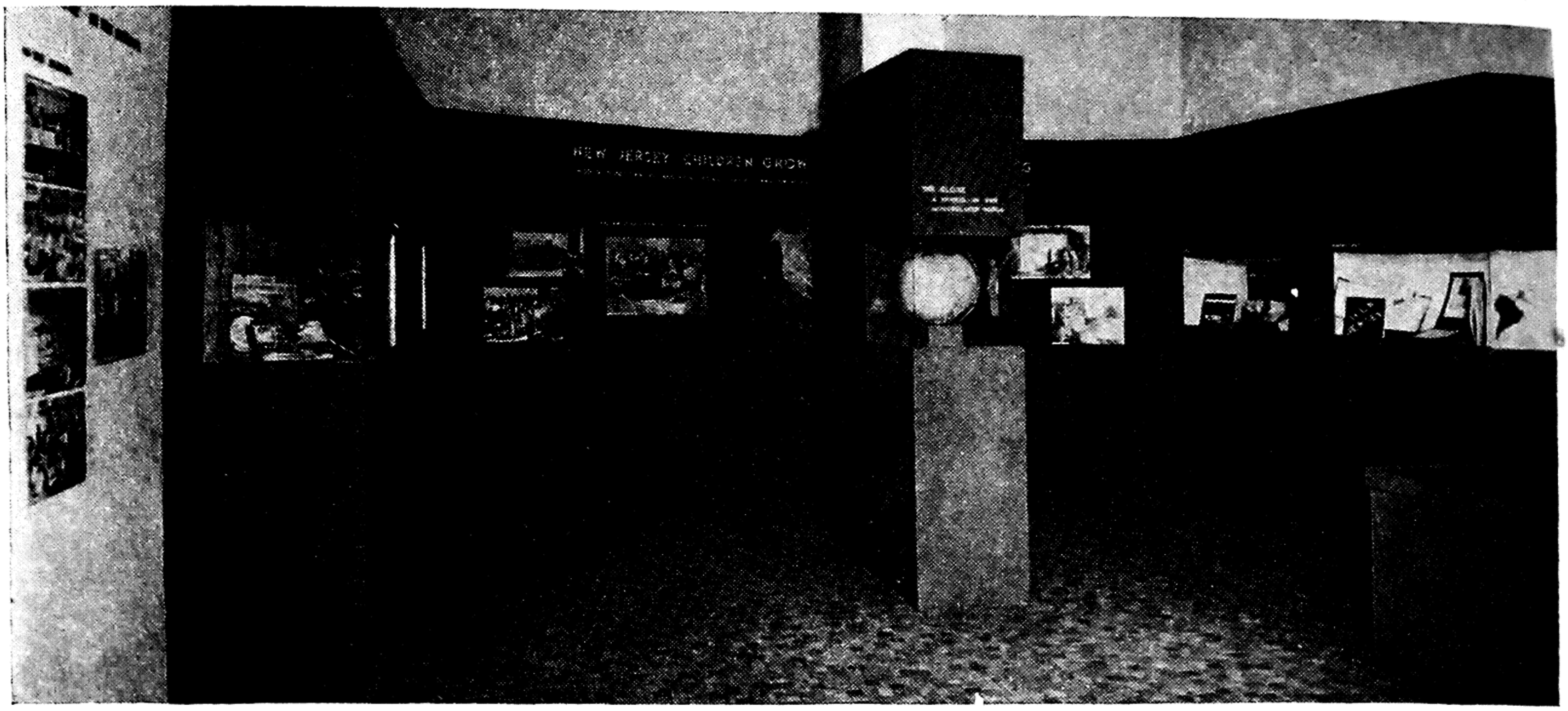
Hobby Fairs. Schools have had uniformly high success with hobby fairs. These so-called fairs are specialized exhibits of the work done by pupils either in or out of school. Parents take a great interest in these projects.

The Buhl Planetarium in Pittsburgh in conjunction with the Association of Scientists and Science Teachers has sponsored three annual Science Fairs held in the Planetarium and lasting one week each. All exhibits relate to some branch of pure or applied science. The "Fair" is open to senior high-school students and top prizes consist of scholarships to colleges and universities. Exhibits which have won prizes in these contests are no fly-by-night collections. They have represented interests of long standing, and have been closely tied up with professional ambitions.

SUMMARY

This chapter on representations and displays has sought to bring out the great variety and usefulness of these visual aids. Their values consist chiefly in their: (1) reality, (2) adaptability for pupil participation and planning, (3) inherent interest and stimulation, (4) usefulness as a medium for promoting closer observation, (5) possibilities for developing inference and generalization, and (6) suitability for use with students of all ages and all intelligence levels in practically all subjects.

Three basic principles of learning stand out. They are integration, self-activity, and simultaneous learning. Audio-visual aids, like all other aids and methods, must not be used in isolation. They must be integrated and co-ordinated in a system so that they enable the learner to take his past experiences and cause them to play upon his problems of the moment. What he has already learned enables him to grow in his ability to meet new situations. Self-activity is the only means of true development. Only as the pupil is an active, willing participant, will he grow in ability to react to new situations. The activities in which he engages must seem worth while. They must be directed toward goals which are meaningful,



COURTESY OF NEW JERSEY STATE MUSEUM

This section of a state museum is organized around the theme, "New Jersey Children Grow in World Understanding." This unit is a circulating exhibit for schools and community centers.

and they must provide for the individual differences of pupils as found in their needs, interests, tastes, and abilities. The third principle of simultaneous or concomitant learning must be kept constantly in mind. Learning is not a piecemeal process, but reactions of many kinds to numerous and diverse stimuli. Various secondary goals are always attached to every primary goal. Development of these goals takes place all along the line simultaneously. Thus, the teacher's major goal may be to increase the child's functional knowledge, but while this takes place there are reactions going on which affect the learner in terms of skills, habits, attitudes, appreciations, and social understandings. Visual aids assist learning as a totality.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Make a survey of a group of teachers of a county, a school district, or even just the members of the audio-visual education class in terms of their use of (1) public museums, (2) school collections, (3) the preparation of models by pupils.
2. Comment on the essay of Angelo Patri. Is it an overstatement of the value of the museum?
3. Nothing has been said in this chapter about the use of objective aids in connection with language and literature. To what extent do objects and representations have bearing on the teaching of these subjects?
4. One writer maintains that "the condition and influence of school museums waxes and wanes with the influence of individual teachers." Is this a fair statement? Discuss.

5. Outline the steps in planning and executing a room exhibit as a part of an "open house" program for National Education Week.
6. Compare values of floor representations with those of the sand table.
7. Compare the values of life-size figures with miniatures for school study.
8. Contrast the philosophy and the function of the public museum of a generation ago with the progressive modern museum.
9. Are teachers' individual collections of object materials for use in their own classrooms preferable to centralized collections of such materials which are accessible to all teachers?
10. How can the one-room or rural district school make effective use of museums?

LABORATORY EXERCISES

1. Each member of the class should prepare some of the materials listed in this chapter.
2. Make a museum collection for a particular unit of study in any grade or secondary-school subject.
3. Construct a terrain model of your campus (see reference to U. S. Navy Bulletin Navexos, P-296).
4. Make wood or cardboard models specifically designed for use in the teaching of arithmetic or solid geometry (consult Eighteenth Yearbook for suggestions).
5. Screen the film, *The Living Gallery* and analyze it to see if the Toronto Art Gallery fits the standards for galleries and museums described in this chapter. List the different activities offered for children of various ages in the film. *The Living Gallery:* produced by National Film Board of Canada, Toronto, Canada, or 620 Fifth Avenue, New York 20; 2¼ reels, 26 minutes; black and white; 16-mm., sound; rental $2.50, purchase $50.00.

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Chapter 14

DEMONSTRATION, DRAMATIZATION, AND PUPPETRY

Demonstration, dramatization, puppetry are important techniques which have long been in use in classrooms all over the country. Most texts on audio-visual education tend to overlook the first two of these.

DEMONSTRATION

A demonstration is a form of illustration to make some idea, fact, or relationship clear to the learner. The term *demonstration* is applied to a process rather than to a thing. The term is frequently coupled with lecture, and a *lecture-demonstration* designates a type of instruction which combines illustration and explanation. A lecture-demonstration is a type of vicarious experiencing, yet it is not far removed from perceptual experiencing. Students do not handle materials nor produce reactions, but the reactions take place before their eyes, and they make firsthand obser-

vations. They follow the explanations or thinking of the instructor; in this the learning process is analogous to reading an account of how to produce a certain reaction. The demonstration is, therefore, intermediate between verbalistic and perceptual learning, or more specifically it combines the two.

Perceptual learning is often a time-consuming process and needs to be condensed. This can be done in many learning situations without sacrifice of values. Following the thoughts of others is, in like manner, time consuming, vague, and uninteresting. The lecture-demonstration seems to be an ideal compromise, but it is a technique which cannot be applied equally well to the teaching of all subject areas. It seems particularly well suited to the natural sciences, and somewhat less well to art and music. The lecture-demonstration centers attention upon relationships, processes, or reactions which result as a manipulation of things, machines, or appliances. Thus, the lecture-demonstration is different from the illustrated-lecture which deals with objects or scenes in which the vehicle is pictures, slides, exhibits, or specimens.

Values of the Lecture-Demonstration. Experimental studies have thrown much light on the demonstration as a teaching technique. From 1912 to 1940 these studies were particularly numerous, and the cumulative evidence clearly indicates that when compared with individual laboratory experimentation, the teacher-demonstration is more economical of time, and is just as effective. Some experimenters claim that it is more effective both for bright and dull pupils, and for immediate and delayed recall. When placed in the laboratory to do individual experiments, students waste an inordinate amount of time, develop lazy work habits, fixate many erroneous ideas, and waste materials.

With these facts before them, and with school financial economy a necessity in many places, teachers and administrators are leaning heavily on lecture-demonstrations. These demonstrations assure greater concentration of interest, and an elimination of all irrelevant materials. Fewer pieces of expensive equipment are needed, and the ratio of students per teacher can be higher—a double economy. Learning under this method combines both concreteness and theory.

Experimental evidence also supports the claim that beginning students in particular do better under the demonstration plan. There is, however, some evidence that advanced students, and students with unusual scho-

lastic aptitude, profit more from the conventional individual laboratory procedure.

Adult educational institutions such as planetariums, museums, and scientific institutes have arranged among their displays many "push button" demonstrations. This sort of demonstration is essentially the same as the one the teacher performs before the class. In some instances, the mechanical or push button demonstration has a recording connected with it which explains the operations. The public is much interested in these demonstrations. Several of the larger universities have done some experimentation with the same device. Thus, the laboratory is all set up in advance for various experiments, and students simply push buttons, observe the demonstration, and record their observations and conclusions.

Students should be given opportunities to give demonstrations before the class. Not only is the responsibility wholesome, but the actual learning values are great, and the effect on the group beneficial. The demonstration becomes a public performance and the student in charge realizes that he must not fail.

Demonstration Techniques. To be effective, the demonstration must actually show clearly and unmistakably the thing it sets out to do. If it does not, it is of little or no value. If the mathematics teacher bisects an angle, and on actual measurement it is found that there is much

These junior high school students are demonstrating electromagnets.

COURTESY OF ST. LOUIS PUBLIC SCHOOLS



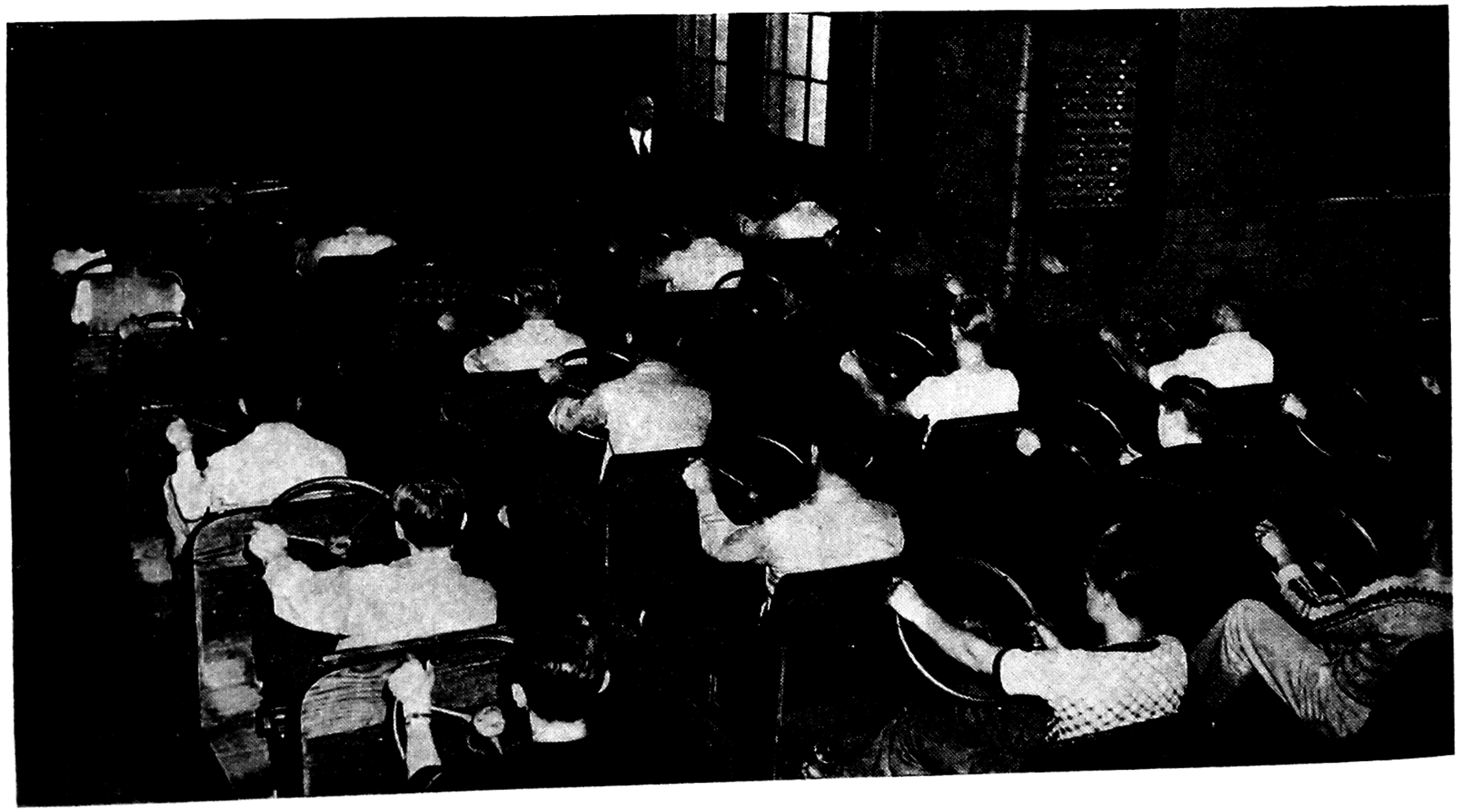
difference in the degrees of the two angles, the demonstration is a failure. No amount of explaining and apologizing for poor tools will be convincing. Students will leave the classroom only partly convinced, and without the confidence in the teacher that they would have had if the demonstration had actually *demonstrated.*

Effective demonstrations should not be a difficult task for any instructor who is properly trained for his job. The following principles summarize the techniques of effective classroom demonstrations:

1. The instructor must be positive that he can perform the demonstration, and that he has the necessary equipment and materials. If necessary, he should rehearse the demonstration in advance to be sure that it works and that everything is in readiness. Apparatus needs to be set up in advance and laid out where it can be picked up as needed. Should the demonstrator have to leave his demonstration and go fumbling in drawers or cabinets for additional equipment, the interest of the class will be dissipated. This principle is just as true of an informal demonstration as of a larger and more comprehensive one. Examples of this can be witnessed nearly every day in schoolrooms; the teacher turns from the text or class discussion to the blackboard to give an impromptu illustration. He looks in the chalk tray around the room for chalk, then in a cupboard or desk, and finally sends a pupil to the supply room. When,

This high-school class is learning to drive by means of practice units. The lights on the board at the right represent brake, clutch, shift, etc.

ACME



and if, this illustration or demonstration takes place, its value will be far less than if it could have been performed at the moment. Simple impromptu demonstrations such as are performed every day by hundreds of teachers are very effective. Their purpose is clarification through concrete illustration. The geometry teacher who picks up a piece of paper from his desk and deftly and surely folds it to illustrate planes or surfaces, impresses his students. They see and understand. The demonstration comes at the psychological moment, and the confidence of the class in the instructor is enhanced.

2. Aside from the simple illustration just mentioned above, the learner must be prepared in advance for the demonstration. This is, of course, a rather obvious generalization and its applicability to a wide variety of procedures is understood. It relates the demonstration to the unit of work, it defines its purpose, and it orients the learner. It has meaning because it is a part of the problem or unit of work. The pupil is motivated and interested; he looks forward to the demonstration. If teachers err in this connection, they err in not telling the students enough, rather than too much.

3. During the demonstration, the instructor lectures informally, pointing out relationships as they develop in the demonstration. He stimulates the students by questions, comments, anecdotes, and indications of applicability of the methods, apparatus, or materials used. Students are assisted in their thinking; they are skillfully directed to observe, compare, contrast, apply, evaluate, and generalize. The teacher who has a pleasing voice, a confident and informal manner, and a touch of humor makes the demonstration an effective medium of instruction. Questions from the observers should be encouraged and pointed up. The observation must be active.

4. Every member of the group must be in a position to see all the steps in the demonstration. Demonstrations which involve small materials which can be seen only by the students in the front row cannot accomplish optimum results. Obviously, some demonstrations will present difficulties from this standpoint. The chemistry teacher who desires to demonstrate the preparation of hydrogen sulphide under a hood or the careful weighing of a precipitate in an enclosed set of balances must use ingenuity. Many demonstrations will be of such a nature that parts of the apparatus, materials, or resulting components can be passed around to the members of the class for closer, firsthand observation.

5. The demonstration should be so timed that at its conclusion, there is ample time for a discussion of procedures, the drawing of inferences, and summarization.

6. The follow-up will be an evaluation in some form. This will enable the instructor to know how much the learners actually got from the demonstration, and whether parts, or all of it, must be repeated.

Risk summarizes the successful demonstration in the following manner:

1. Prepares the learner
   (a) Raises problems—the real stimulus
   (b) Orients pupils—makes problem meaningful
   (c) Motivates pupils—makes problem attractive—creates desire to learn, to investigate, or to study
2. Guides learning
   (a) Selects (shows) important relationships
   (b) Demonstrates important relationships
   (c) Stimulates and guides critical analysis, helping students compare, contrast, and evaluate
   (d) Leads to desired generalizations
3. Evaluates learning
   (a) Furnishes means of testing or applying to determine learning success or to perfect learning where learning has not taken place
   (b) Stimulates self-testing on part of pupils[1]

Football and other athletic coaches employ the principles of preparation, guidance, and evaluation in a most complete manner. The players (learners) are brought together and new plays are discussed. Illustrations are worked out on the blackboard, partial demonstrations are acted out on the gymnasium floor by a few selected players, and then the entire squad goes on the playing field to test and perfect the new plays which may be offensive plays or defensive plays against known plays of opposing teams. The system then meets its crucial test in a scheduled contest. The ultimate evaluation comes in the first session of the coaches and players following the contest. This "bull session" becomes a critique of strategy and performance, which may be materially enhanced by projecting motion pictures made during the contest. No greater individual or group self-testing is imaginable.

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[1]Risk, Thomas M., *Principles and Practices of Teaching in Secondary Schools*, Second Edition, p. 385, American Book Company, New York, 1947.

many component parts that they provide opportunities for all types of pupil-abilities, and for co-operation of nearly the entire school. A pageant may involve the departments of English, social studies, fine arts, industrial arts, home economics, mathematics, physical education, music, and others. A pageant presents a wide sweep of time and events, and brings these together into a continuity which makes it possible for the student to grasp these factors without too much difficulty.

The pageant is not a classroom activity but an institutional one; as such it can develop esprit de corps. It also provides opportunities for healthy co-operation between the school and the community.

Disadvantages and limitations to pageants are practically obvious. They are usually time consuming to an unwarranted degree; they interfere with the educational program of the school and with the regularly scheduled work of nearly every teacher; and after they are presented they quickly pass into limbo. Some schools have tried to offset this last limitation by photographing the pageant in motion pictures so that the study and research which went into the creation of the pageant are preserved for use with future students.

The Pantomime. Among the natural play activities of children, pantomime ranks high. It is a simple form of dramatic expression which the alert teacher will find many opportunities to use. Many timid children who are not facile in verbalization will often take an active part in pantomiming. Through this activity they may quickly lose self-consciousness, and grow in poise and freedom of movement. Dancing and rhythm can be used in addition to the gestures, the body movements, and the changing facial expressions of simple mimicry. Pantomime calls for no rehearsals, costuming, or staging, and can be utilized in many classroom situations.

Pantomiming is not limited to the elementary school. Secondary-school teachers use it frequently and advantageously. To illustrate, the teacher of a sophomore English class found that the students were very stiff and reluctant to speak out. He organized the class into committees and asked each committee to do an impromptu pantomime before the class. Fifteen minutes were allowed for committee conferences and the work began. By the time all the committees performed, the ice had been broken, and the class was well on the way to a congenial start.

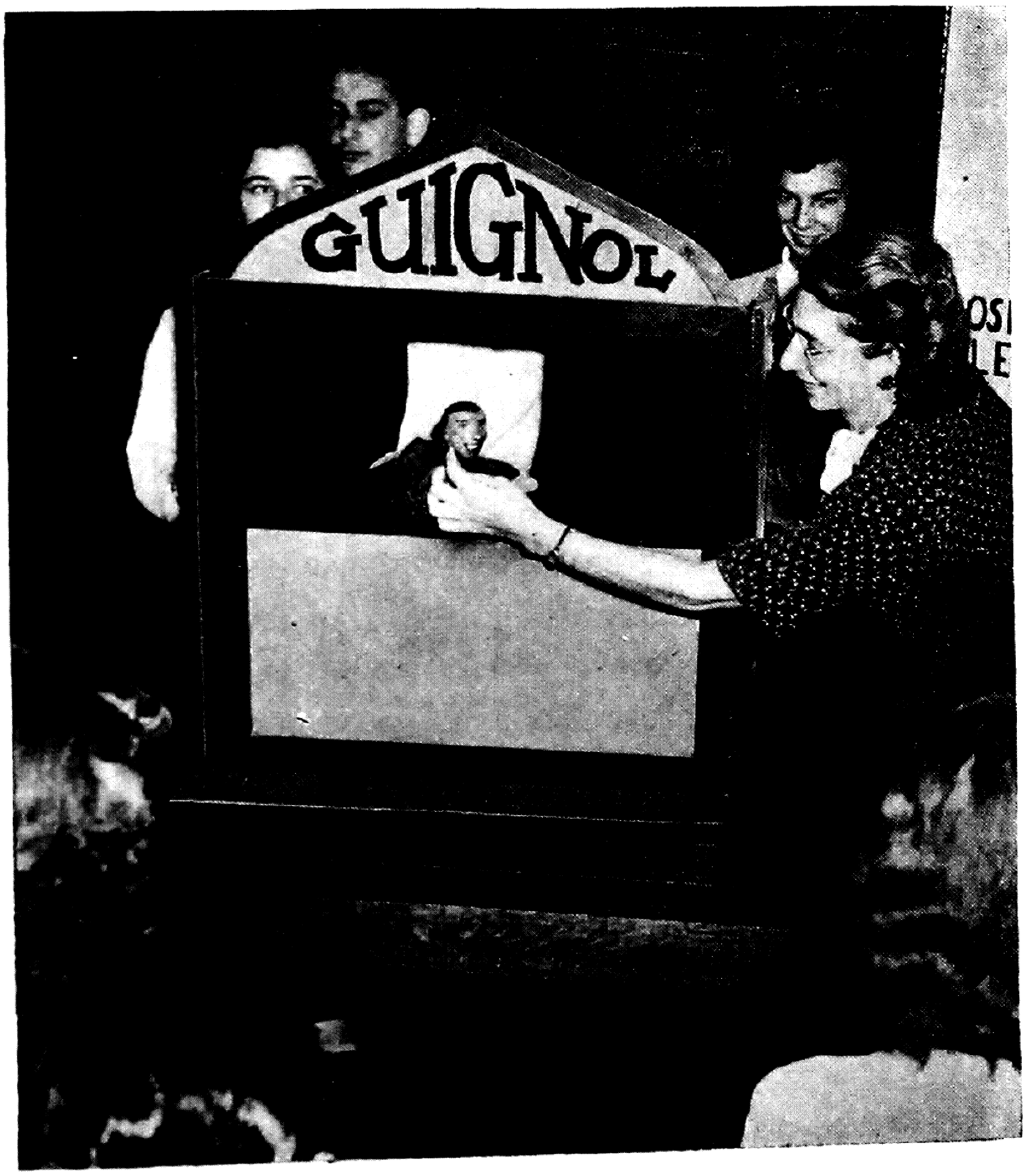
Tableaux. A tableau is a still representation, usually framed, of a picture, scene, statue, portrait, or habitat grouping, by a person or group

of persons posing in appropriate costume. Although simple, it is rather formal and stilted and has little value unless it serves as a component part of a larger production in which particular scenes are posed for momentary effect. In pageants, transition scenes are often staged as tableaux.

PUPPETRY

The art of puppetry dates back to antiquity. No one geographical spot stands out as the home of puppets. Throughout the world, historians have found puppets in one form or another. No one knows how long they have been used in China and India. In Japan, Java, Siam, Burma, and Turkey, their use is likewise ancient. Before the pyramids were built, the Egyptians were using puppets, and it is quite probable that the Greeks borrowed the art from the Egyptians. Xenophon describes puppet shows in his writings. As Greek civilization was passed along to the Romans, so was the art of puppetry.

In more modern times in the Western World, all countries of Europe have made extensive use of puppets, especially Italy, France, Russia, and



This Spanish class is motivated by its use of puppets.

COURTESY OF ATLANTIC CITY PUBLIC SCHOOLS

England. Punch and Judy have played a prominent role in English entertainment for years, and were brought to the United States by Englishmen. It has been the Italians, though, who have done more than any other group to popularize puppetry here.

There has been a noticeable re-awakening of interest in puppets in the United States. This seems to have started in the late twenties. At one time they were looked upon as silly entertainment for children, but as one writer has phrased it, "They are for children of six to sixty." Puppetry has found its way into the schools, clubs, camps, Little Theatres, museums, and many art groups. It is considered an art and dramatic form with splendid educational values. The performances of the Yale Puppet Players are well known to thousands. Several universities offer courses in the various aspects of puppetry.

Puppets and Marionettes. Derived from the Latin word *puppa* which means doll, the word *puppet* today means a figure which fits over the hand like a glove and is operated from behind or below by the fingers.

Marionettes are figures with movable limbs which are manipulated by strings, wires, or rods from above. The word is of continental origin. People of the Middle Ages who saw the little figures likened them to the statues of the Virgin Mary, hence, the diminutive *marionette* from *Mariole,* a small image of the Virgin Mary.

Many authors use *puppet* and *marionette* interchangeably, or they use puppet as the word embracing all forms of automata. In the following pages, the forms will be discussed together since their values and utilization are similar. Wherever specific reference is made to the glove-like figure, *puppet* will be used, and *marionette* will designate the string-operated character.

Each of the forms has its advocates, and many people are of the opinion that puppets are more appropriate for younger children, and marionettes for older. No such distinction can be made with finality, because all ages are intrigued by both forms. In the matter of construction and operation the puppet is simpler. The artist and craftsman find more outlet for their abilities in the marionette.

Educational Values of Puppets and Marionettes. Puppet and marionette projects should properly evolve from the activities in the regular classroom. Episodes from history, literature, health, nature study, or other fields have dramatic possibilities. Dressing dolls to represent characters

in a story is always interesting, but the making of puppet or marionette figures of the characters is exhilarating. Co-operation, assumption of responsibility, and clear thinking are certain to follow. Children beyond the third grade can make satisfactory puppets, and those beyond the fourth grade can do well with marionettes. Simple flat forms cut from box tops and made to stand up (stationary) in a paper-box theatre represents a project well-suited to first- and second-grade children.

After the figures have been made, the next step concerns utilization. This usually involves the giving of a play, or the acting out of scenes and episodes. For this activity, some classes will prefer to write original plays with appropriate lines for the different characters, and often the parts will be memorized. Others will prefer to have the actors supply the dialogue as the scenes develop. Stage settings and accessories will be developed. Building an appropriate stage may be included in the project.

Miss Mildred L. Sullivan, a sixth-grade teacher in the University of Minnesota Elementary Demonstration School developed a puppet project with her class which was so successful that a description of it was included in a university bulletin on units in the elementary school.

Miss Sullivan set up the following objectives for the unit:

1. To help each child find a place in his social group
   (A creative activity of this kind would require working with the group for a common purpose; consequently all would share the joy of achievement. Each child would need to exercise many socially desirable habits and attitudes, such as co-operation, personal responsibility to the group, courtesy, and appreciation of the talents and contributions of others.)
2. To provide for individual differences and abilities and to explore new fields for children of special aptitudes
3. To offer incentives to work in such regular subject fields as art, reading, literature, language arts, music, and literature
   (The periods set aside each day for the various subjects could be spent working on problems pertaining to the unit.)
4. To have each child experience work in as many media as the unit might offer
5. To challenge the ingenuity and inventiveness of the group
6. To develop critical judgments
7. To stimulate further artistic efforts
8. To open a field for desirable leisure-time activities[3]

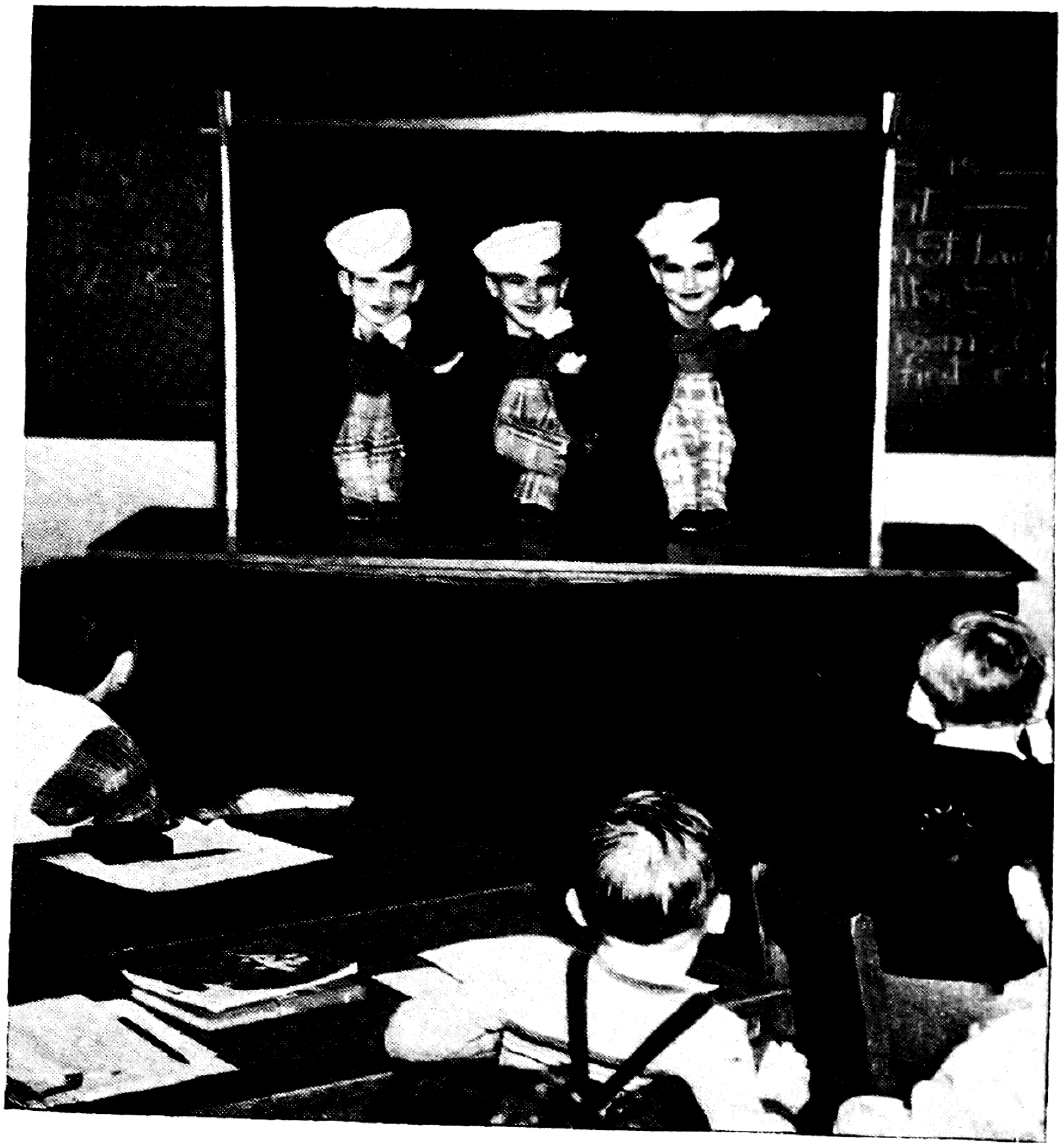
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[3]*Illustrative Teaching Units for the Elementary Grades*, The University Elementary Demonstration School Faculty, University of Minnesota Press, Minneapolis, p. 82 (in chapter 11, "Puppets and Puppetry"), 1941.

The outcomes of the project show what Miss Sullivan felt she achieved:

1. Wholehearted co-operation of every member of the class
2. Timid children and slow-learners made significant contributions
3. A great deal of out-of-school work was done
4. Plans were made for a puppet club to be carried over into the summer
5. The interest and knowledge were carried over to the scout and campfire groups
6. A noticeable interest in reading developed
7. There was an improvement in oral and written forms of expression
8. The need for accurate measurements, including fractions, was reflected in arithmetic
9. More interest in music
10. A development in sensitivity to color, design, and craftsmanship

Miss Ida Mae Stilley, a supervisor in dental hygiene in the Pittsburgh Public Schools, has achieved signal success by illustrating her talks to the grade-school children with a single hand puppet. This puppet was named "Happy" by the children. As Miss Stilley goes from room to room and school to school, Happy goes with her. Miss Stilley carries a case with her



A show climaxes the making of puppets. Interest is apparently still high at the end of the project.

COURTESY OF THE ST. LOUIS PUBLIC SCHOOLS

which includes some twenty-odd costumes for Happy. Happy brushes his teeth, and eats plenty of the seven basic foods. Included with Happy's wardrobe, Miss Stilley has waxen oranges, carrots, tomatoes, and standard toothbrushes for children. It is impossible to imagine the effectiveness of these demonstrations unless they have been seen. Miss Stilley is so well known among the children of Pittsburgh that whenever she drives up to a school, the children throng around and bombard her with questions about Happy. Happy has given demonstrations to PTA's, teachers' institutes, and state educational conventions.

Puppetry is not restricted to elementary-school use by any means. High-school history and English teachers have found this a valuable educational device. The construction of puppets and marionettes has proved to be a fertile art medium. Many high schools now offer regular courses in puppetry. The art department in the Erasmus Hall High School in Brooklyn enrolls five hundred students in the course in puppetry with four art teachers giving most of their teaching time to it. The course has been built into a two-year sequence. In this school, puppetry is considered chiefly a phase of art and only incidentally a craft. It has been found that this art form provokes inquiry into the fields of literature, history, and everyday living.

As a form of dramatic expression, puppetry is closely related to formal drama. Puppet enthusiasts, however, maintain that their art has many advantages over the conventional school drama. It provides opportunities for many participants. It is inexpensive, and requires little in the way of costumes, scenery, and stage equipment. During the process of producing a marionette play, students may engage in every angle of the production, whereas in producing a regular drama, students are assigned particular parts to be memorized, and that is the extent of their experience. Furthermore, too often the regular student play is likely to be only an aping of a professional production. It is interesting to compare the educational experiences and values for the students in producing a regular play such as *George Washington Slept Here* with borrowed scenery and rented costumes, and a marionette play written by the students from a *Sketch Book* story, for which the students make and dress the marionettes, build a stage, and put on a simple performance. Both have possibilities for integrating the work of various areas, but probably the marionette show has more dynamic possibilities.

Although emphasis is being placed on puppetry as a visual aid to class-

room instruction, it quite obviously is also useful for auditorium purposes. It is as a classroom teaching material that the emphasis on puppetry is justified. It can be a serious learning activity which calls for mental alertness and sustained manual skill.

Construction of Puppets and Marionettes. An infinite variety of materials may be used in constructing figures. These materials may vary from flat cardboard figures, rag forms, molded forms, wooden forms, up to the elaborately carved ivory forms of some of the professional shows. Teachers who desire to know more about the construction and manipulation of puppets and marionettes should consult a manual or handbook.[4]

Puppets and marionettes may be of any size. They may range from

[4]The reference to Margaret Sullivan at the end of this chapter contains an excellent bibliography for handbooks, projects, and books for children. The reference to the Cornell Rural School Leaflet describes marionette construction in detail. *Puppetry in the Curriculum,* a manual prepared for elementary and junior high schools, gives descriptions and working drawings for the making of puppets.



A Last Look Behind the Scenes Just Before Curtain Time

COURTESY OF THE NEWARK, N. J., PUBLIC SCHOOLS

one to five feet in height and from one to one hundred and fifty pounds in weight. Each group will have to determine the size best adapted to its particular needs. Marionettes which are twelve inches tall are approximately one-sixth actual size; fifteen inches, one-fifth; twenty-four inches, one-third normal size, and so forth. It is important to remember that when a size has been decided upon, all other properties used in the production such as tables, chairs, and books, must be scaled accordingly.

Teacher Training and Preparation. Even without formal training any teacher, who has a willingness to learn, armed with a good manual, may soon learn to construct and manipulate puppets and marionettes. Courses are offered in several universities. The nature of these courses is evident from three examples taken at random.

> Columbia University, Teachers College (New York City). Fine Arts 129, Marionette Production. 2 points credit. "Designing and constructing marionettes. Manipulation, staging, and lighting in marionette production. Marionettes and hand-puppets discussed as classroom projects in elementary and high schools. Prerequisite: Course in fine arts or experience satisfactory to the instructor."

> Temple University, Teachers College (Philadelphia). Industrial Arts Education 39e–40e, Puppetry. Credit—4 semester hours. "The course is planned primarily for teachers and the subject will be approached from the standpoint of the marionette in the classroom. The construction of a marionette; manipulation, writing the marionette play; stage construction; lighting and scenery painting."

> University of Washington, Department of English, Division of the Drama (Seattle). English 107, 108, 109, Puppetry. 2 credits. "A practical course in educational and professional puppetry; history and presentation of the marionette theatre; design, construction; costuming, stringing and manipulation of puppets, portable puppet stage construction, making and manipulation of hand-puppets and shadow figures."

Shadow Figures. Only limited use is made of shadow figures in schools. There seem to be no especial advantages to this particular form of puppetry, and staging is often quite troublesome.

Two forms of shadows are used in shadow plays—silhouettes and translucent figures. A thin, tightly drawn cloth acts as a screen for the miniature stage and the puppets are operated from below the stage. The figures, moved by rods, are held close to the screen, and, by means of a subdued light behind them, cast shadow figures on the screen. Bits of scenery can

be painted upon the screen or pressed close against it. In the case of silhouettes, faces have to be in profile. Movable body parts that can be seen in silhouette are necessary.

Translucent shadow figures are most intricate, and as an art appear to be typical of the Orient—China, Japan, Java, Burma, Siam, and Turkey. Joseph describes the Siamese translucent shadow figures thus:

> They are made of hide which has been previously cut, scraped and stretched with extreme care. The technique of decorating the figures is most difficult, for the forms are stenciled and perforated by an infinite number of pricks, to indicate not only the outlines but also the nature of the fabric of the garments, the jewels, weapons, etc. These perforations scarcely show unless held before a light, when they give a very rich and variegated effect. There is great art as well in the dyeing and fixing of the colors, and in estimating the amount of light which should be allowed to penetrate so as to give a well-proportioned aspect to the figure as a whole.[5]

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Compare the values and limitations of the use of real characters in dramatization with the use of puppets and marionettes.
2. From your own experiences with dramatic productions, relate incidents which demonstrate the value of formal dramatization versus dramatic expression or interpretation.
3. Show specifically how dramatic work enriches experiences and relieves formality.
4. Outline a pageant suitable for an entire school production.
5. Locate two scientific studies dealing with the demonstration. Can you discern any trends with regard to its use as an instructional technique?
6. Argue the merits pro and con of on-the-spot demonstration versus use of a demonstration film.
7. Someone once advanced the idea that an intelligent concept of chemistry can be had without ever touching a test tube or a set of balances. Is this laboratory activity nonessential? Discuss the idea. Can demonstration replace individual laboratory performance?

LABORATORY EXERCISES

1. If there is a teacher of home economics, track, or machine shop in the class, ask the teacher to prepare and present a fifteen or twenty minute lecture-demonstration on how to bake a cake, run a hurdle race, or operate an engine lathe. Follow this demonstration with a motion picture on the same subject. (There are several good skill films on each of these subjects. Here are three suggestions: *Four Hundred Years of Cake Baking in Four Min-*

[5] Joseph, Helen H., *A Book of Marionettes*, p. 29, The Viking Press, Inc., New York, 1936.

utes, produced by General Foods Corporation, New York, 10 minutes, sound; *Dashes, Hurdles, and Relays,* produced by Encyclopedia Britannica Films, Wilmette, Ill., 20 minutes, sound; *Rough Turning Between Centers,* or *Drilling, Boring, and Reaming Work Held in a Chuck,* produced by the U. S. Office of Education and distributed by Castle Films, New York.)

2. Each member of the class should make at least one puppet and one marionette. If time permits construct a stage and produce a short puppet play, such as a scene from *Ivanhoe, Lady of the Lake, The Merchant of Venice,* or *Ali Baba.*
3. A committee might well experiment with a shadow puppet play of the silhouette type depicting a simple story such as "Little Red Riding Hood," "Three Little Bears," "Little Jack Horner," or the story of Daniel Boone.
4. Try to locate a school or museum in the vicinity which has produced puppet shows. A class visit to this project will be beneficial; particularly so, if a demonstration can be arranged.
5. There are several motion picture films which deal with one or more of the dramatic arts discussed in this chapter. The class will find it advantageous to screen and discuss these films. For rentals consult your local film rental library.
   (a) *ABC of Puppets,* 10 minutes, sound, black and white, produced by Bailey Films, P. O. Box 2528, Hollywood, California.
   (b) *Chinese Shadow Play,* 10 minutes, sound, color, produced by China Film Enterprises, 142 W. 43rd St., New York 18, N. Y.
   (c) *Make a Mask,* 16 minutes, silent, black and white, produced by International Theatrical and Television Corp., 25 W. 45th St., New York 19, N. Y.
   (d) *Marionettes—Construction and Manipulation,* 15 minutes, silent, black and white, produced by Brandon Films, Inc., 1600 Broadway, New York 19, N. Y.
   (e) *Punch and Judy,* 19 minutes, sound, color, produced by Gateway Productions, Inc., 40 Fremont St., San Francisco 5, California.
   (f) *Puppetry: Stringed Marionettes,* 10 minutes, sound, black and white, produced by Encyclopedia Britannica Films, Inc., Wilmette, Illinois.

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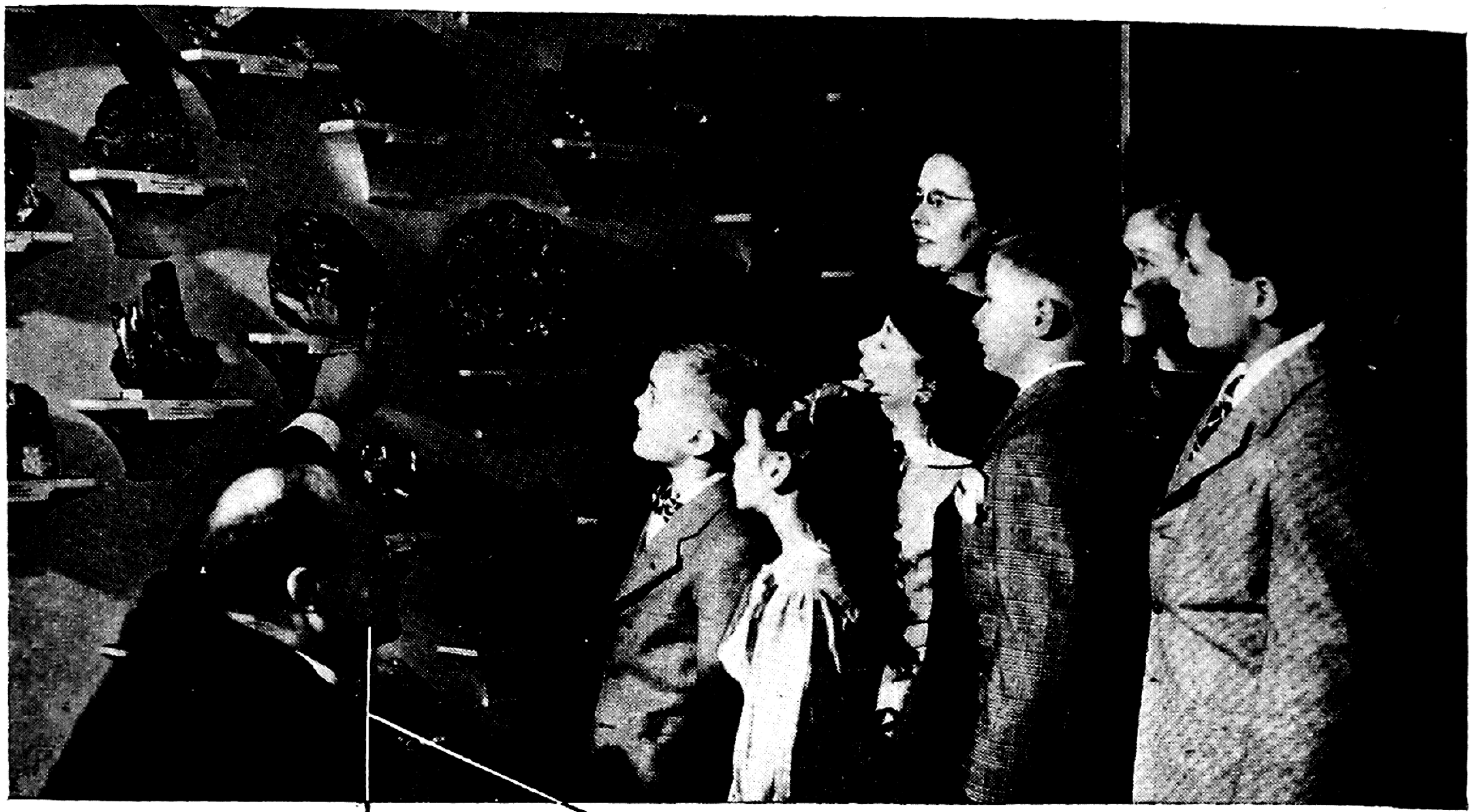
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Chapter 15

THE SCHOOL JOURNEY

CAMPUS FRONTIERS

No college campus can house
America's tremendous industry;
No college course can grasp
The sweat, the brawn, the brains
Of millions of men;
No textbook can show
The human effort, the smoking stacks,
The unending creep of production lines.
No picture can reach
The scope of America's economic life,
The problems of our industrial society,
The contributions of our industry.

But into the tissue
Of the young men of America,
These things must penetrate.
In the tissues of their hearts and minds

The giant new things to America
Must be understood.
This is the belief of those who know and love America.

—*Antioch Notes,* Antioch College

"No college campus can house America's tremendous industry," nor can any college campus, library, classroom, or school system of any kind whatsoever house her social, civic, and political fabric, her natural resources, her beauty, her historical places, her contributions to art and architecture, nor her culture and her people. These are aspects of America which can be found in books, but even more, they are to be found in direct experiencing.

Observation and direct experiencing of the type to be discussed in this chapter are to be found in the educational literature under the headings of excursion, journey, trip, and tour. The *Education Index* catalogs all this material under the heading "School Excursion." It is the contention of this author that the term *school journey* is more meaningful and appropriate. *Excursion* connotes pleasure, *trip* implies a short journey such as a trip to the local power plant or the zoo, and *tour* calls to mind a quick glance or superficial observation. *Journey* seems to imply travel and study of long or short duration.

As used in this chapter, the school journey can be defined as a teaching technique involving any definitely organized travel made primarily with an educational motive in mind. The journey grows out of the students' need for firsthand data to assist them in solving their problems. It involves an organized plan by which students journey to places where the data exist in natural form or functioning order. Although many materials may be brought to the school for firsthand study, there are numerous other materials, situations, relationships, and phenomena, which, because of their bulk, immobility, or diversity cannot be taken into the classrooms. If these materials are to be studied directly, students must go to them. The interpretation given to school journey at this time includes trips of a few minutes, illustrated by the teacher who takes his class into the schoolyard to observe a tree or the building of a wall, as well as the long journey consuming an entire day or several days. These journeys may be taken during school hours or they may be planned for Saturdays or after school hours. Finally, the discussion here eliminates trips or excursions which are not primarily taken for study purposes, such as trips taken by athletic teams for contests, picnics, and graduation class ex-

cursions. Such affairs do not involve teaching techniques, except in remote ways.

SCHOOL JOURNEYS AS A PART OF THE SCHOOL CURRICULUM

The Origin. The great Swiss teacher, Johann Heinrich Pestalozzi, placed much emphasis on observation and experimentation. His teaching methods and philosophy, anchored in sense perception, are studied by teachers everywhere. Yet many teachers who know how Pestalozzi enriched his teaching by practical methods, and who truly believe that these methods facilitate learning, are content to confine their teaching activities to such materials as are usually found within the four walls of the classroom.

But the idea of the school journey was not originated by Pestalozzi. There were Greek peripatetic teachers before the Christian era who took their scholars to the "field" to gain firsthand knowledge. Herodotus and Xenophon travelled abroad to gain their knowledge of peoples and lands. Roman scholars travelled widely in Rhodes, Greece, Egypt, and elsewhere. During the Renaissance period, Italy was the Mecca of the educated.

Comenius, Rousseau, Froebel, and other famous educators of the eighteenth and nineteenth centuries advocated the school journey as a valuable learning procedure. More recently in the United States, Francis Parker, the McMurrays, John Dewey, and Harold Rugg have given voice to the same views.

The Development of the School Journey Abroad. Starting before the turn of the last century, England and Germany showed great interest in the school journey as a teaching technique, and developed it to a place of significance. In addition to England and Germany, notable use of the school journey has been made in Fascist Italy and Soviet Russia. To a lesser extent it has been used by the schools of Poland, France, Holland, Scandinavia, and Japan.

Germany. As a teaching technique, the school journey probably attained its greatest development in Germany during the days of the Republic—1918 to 1933. The Ministry of Education encouraged school journeys as a means of enlivening study and of developing students' inter-

ests. It was also used as a means of developing a kind of local patriotism.

When Hitler came on the scene in 1933, he directed that all youth organizations be united as the Hitler Youth Association. Excursions and trips became a very important cog in the educational machinery of the Hitler regime with particular stress being placed on physical fitness and loyalty to the Fatherland. Through school journeys, the German youth learned more and more about their leaders, traditions, ethnology, resources, and culture. School journeys were extended from a few hours or a day to days, weeks, and even an entire season. They reached beyond the borders of their own country, and the tie-up with the aims of the national government was close.

England. One of the earliest recorded organized school journeys was made by an English class which went in 1877 to Switzerland to study glacial formations. Interest in the school journey became so pronounced that in 1911, the "School Journey Association" was founded. Its motto was, "Travel is the slayer of prejudice." Four kinds of journeys were developed in England: (1) The "junior school journey" was open to elementary schools, and included trips to municipal buildings, places of historical interest, and so forth. (2) The "walking journey" was developed chiefly for exercise and recreation and included journeys to parks and adjacent country. Both of these types of journeys were made during school hours. (3) The "homeland journey" was recommended for secondary schools and included tours of the British Isles for the study of history, geography, and social customs. (4) The "long journey" was open to university students and included travel in continental Europe and to the British colonies.

English and German School Journeys Contrasted. Fundamental differences can be noted in the use of school journeys in England and Germany. In the latter, the purposes are chiefly to develop an appreciation of the German people and culture in order to assist in developing loyalty to the state. In England, the purposes are more appropriately educational —"culture is acquired fundamentally through friendly contacts, wide experiences, and knowledge." Germany seems to have used the journey as a rather basic method of instruction, but in England it has been considered more as a supplement to the regular instruction of the school. In the former, the work was detailed and regimented; in the latter, it was loosely planned and often never systematically followed up.

Development of the School Journey in the United States. American educators and American practice have been influenced by the development in both England and Germany. A great many American educators have recognized the value of trips and journeys and have recommended their use to the schools, yet the adoption of the journey as an organized instructional tool has been slow. Franklin advocated journeys to neighboring plantations so that "the methods of farmers might be observed and reasoned upon." Jefferson, although he seems not to have put it into writing, believed the same, and practiced it widely himself. Numerous school systems have actively used the school journey for years; some have issued bulletins on its use. A few states have given it statewide recognition. Such national organizations as the Association for Childhood Education, the Kindergarten Association, and the Progressive Educational Association have advocated a wider use of this "going out to meet new experiences—objects, persons, ideas—and to feel the heightened sense of living which accompanies an exploration of new fields." The United States Office of Education has advocated it as an especially pertinent way to study conservation.[1] Several notable long journeys taken by students from Experimental Schools, chiefly, and from a few public schools have been described in books and magazine articles.[2]

Colleges and universities have, in many instances, made extensive use of school trips and journeys, journeys lasting in duration from a few hours to several weeks. Antioch College extends the journey into a work-study curriculum. Students of the University of Oklahoma spent several days in Pittsburgh during a recent summer making a study of how a city

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[1]Bathurst, Effie G., *Conservation Excursions,* U. S. Office of Education, Bulletin 1939, No. 13, Washington, D. C., 1940.

[2]Examples: Tippett, James S., *Schools for a Growing Democracy,* Ginn and Company, 1936; *Were We Guinea Pigs,* (written by the students of the Ohio State University Experimental High School), Henry Holt and Company, 1938; Baker, G. Derwood, "An Eleventh-Grade Field Study: The Coal Industry," *Educational Research Bulletin,* 17: 173–88, October 19, 1938 (New York children visit the coal fields of West Virginia); Jones, William J., "Some Further Evaluations of a Field Study Experience," *Educational Research Bulletin,* 19: 99–104, 116, February 14, 1940 (West Virginia children paid a return visit to New York); Powers, Samuel R., and Others, *The Choice of Materials for Advancing the Aims and Functions of General Education,* "The School Journey," pp. 339–41, Thirty-eighth Yearbook, National Society for the Study of Education, 1939; Cebrat, A. E., "Experience—A Gateway to Learning; A Report of an Exchange Study Made between Lincoln School, Columbia University, and the Rural Consolidated School at Dayton, Virginia," *Virginia Journal of Education,* 35: 20–21, September, 1941; Roberts, Alvin B., "The Nation, Our Campus," *Educational Screen,* 20: 5–8, January, 1941; *Time,* 31: 29–30, February 21, 1938.

grows and functions. Field experience, which is a type of school journey, has long been a part of the curriculum of the academies at Annapolis and West Point. Other colleges and universities sponsor tours embracing Canada, Alaska, South America, and Europe.

In spite of the fact that much has been written about the school journey, the schools of the United States have made only sporadic and haphazard use of this medium of instruction. There are undoubtedly many reasons why this is true, chief among them are: (1) the tradition of the "reading school," (2) unfamiliarity of teachers with the school journey as an instructional technique, (3) absence of an emphasis on the school journey in the program of the teacher education institutions, (4) the inflexibility of school programs, (5) wide family travel, (6) the use of radio and motion pictures, and (7) the general educational philosophy of the community. In the main, American schools are book-centered rather than life-centered. In cases where the school journey has been used, its values have been apparent. The purposes served have been largely those of gathering information, rather than creating attitudes or breaking down provincialism. It might well be emphasized at this point that the majority of teacher education institutions do a poor job of sensitizing future teachers to values of the school journey and the techniques of using them.

THE EDUCATIONAL THEORY BACK OF THE SCHOOL JOURNEY

Purposes Served by Studying Afield. School journeys and excursions are more feasible and practicable today than ever before owing to increased transportation facilities and more flexible school organization. Private cars or school buses can be impressed into service with little or no difficulty. It should, however, also be borne in mind that there are many school trips within walking distance of nearly every school. It is said that the great Agassiz, when asked how he intended to spend his summer, remarked that he planned to get acquainted with his backyard.

The specific purposes which the school journey serves are many. A few of the more important ones are:

1. It gives pupils firsthand experiences with objects, things, situations, and relationships which are not possible in the classroom. Such a purpose is especially valid in aspects of nature study, geography, agriculture, history, science, industry, social studies, and occupations.

2. It serves as a source of facts and raw materials not available in textbooks and references.

3. It supplements teaching procedures by serving as a preview of a unit, a development of interest in the work of the unit, or even as a summary of the unit. Curtis[3] of the University of Nebraska found the excursion particularly helpful as a summarizing and verifying technique in cases where students' concrete experiences have been limited.

4. It develops attitudes and understandings in addition to factual background. This is a newer and probably a more significant purpose of the school journey. Students can read about tenant farmers, coal miners, substandard living conditions, and general socio-economic conditions, but it is only when they go into the coal mines and the homes of tenant farmers and the industrially ill-housed that they really understand and appreciate the problems they are studying. This purpose of the school journey transcends by far such purposes as seeing historic markers and national parks. The journey lends itself particularly well to the understanding of social implications. Facts about the exploitation of natural resources are all in books and magazines, but a field trip will do more to develop a clearer understanding of the problem and to create a desire to do something about the problem than all the books in the library.

5. It enables the student to know his environment in a meaningful way. The student has no opportunity to experience much of his environment. Teachers can make arrangements whereby students may visit cer-

[3]Curtis, D. K., "Contributions of the Excursion to Understanding," *Journal of Educational Research*, 38: 201–12, November, 1944.



These school children are experiencing the thrill of a ride with the engineer.

COURTESY OF THE FALK SCHOOL, PITTSBURGH. PHOTO BY *Pittsburgh Press*

tain industries and commercial enterprises which would be closed to them as individuals.

Some Specific Results Which Can Be Expected. In addition to the major purposes served by the school journey, there are many specific advantages and values. Most students need training in how to make observations, otherwise *they look but do not see.* As they become discerning in their observations, students will develop curiosity and interests in the world which surrounds them. They may find that observation and first-hand study of phenomena in their natural setting will assist them in solving many of their problems, or will verify much of what they have learned in the classroom. Field work offers unusual opportunities for the teacher and class to make plans together. Its informality will have a democratizing influence. Students who have found school dull otherwise, may find the spark here which will keep them from dropping out as soon as they reach the end of the compulsory attendance age. It will bring students closer to the society in which they live.

HOW TO CONDUCT A SCHOOL JOURNEY

In order that a school journey may accomplish its purposes, it must be carefully and completely planned, efficiently executed, and systematically followed up. Without attention to these matters, the trip may be a waste of time.

Planning the Journey. To have value and significance, the journey must serve a specific purpose. It should grow out of the regular learning activities of the pupils and be related to these activities. It should help the pupils solve a felt need in their regular work. In order to justify its existence, it must be better than the instructional procedures which it replaces for the time involved.

The teacher and class must be practical enough to know that they cannot make all the trips which might be made in connection with their learning problems. It then becomes necessary to decide which journey or journeys will net the greatest profit to the class; which will give greatest assistance in solving their specific problems. A few well-planned trips will undoubtedly be superior to a larger number taken in a haphazard fashion. Furthermore, if the journey extends far beyond the school grounds, it may be that some of the pupils will not be able to go. Therefore, to

justify the trip, it must really serve a purpose and be carefully planned.

General preparations for the journey are numerous. All details must be taken care of. These include making arrangements with school authorities and with officials at the journey's destination. Parental consent for the pupils to make the trip must be obtained. Matters of transportation, finance, and safety precautions must be settled. The group must know the exact leaving time and the time expected back. Decisions will have to be made as to what to look for during the journey. Other teachers in the building must be notified so that they will know why certain pupils are absent from their classes, and provision must be made for the pupils left behind.

Preparation of the Pupils. When the purpose of the trip has been decided upon by teacher and class, the next step is to prepare the pupils. Interest should be built up so that it crystallizes in the journey. This preparation will come from general class discussion, stories, pupil reports, motion pictures, or the stimulation of an outside resource person. The journey must not be undertaken "cold."

Even though the purpose of the journey is clear to the students, the specifics of what to look for, questions to ask, data to be gathered, notes to be made, pictures to be taken, or officials to see should not be left to chance. In fact, nothing should be left to chance. It may very well be that the class will decide to allocate certain duties and responsibilities to selected pupils or committees; other responsibilities will devolve upon every member of the group.

School trips should be pleasurable as well as instructive. A junior-high-school teacher did the boys of his class a good turn by taking them trout fishing. Teacher and pupils worked up the following simple outline for the trip:

A VISIT TO A TROUT STREAM

(A school journey for junior-high-school boys interested in fishing)

The reasons for making this trip are:

1. To see the kind of stream in which trout live
2. To observe trout under natural conditions
3. To gain a knowledge of equipment used in trout fishing
4. To learn how to use a fly rod
5. To study insect life on a trout stream

The Stream

The South Fork of Benscreek is a good stream to visit because it shows, in a short distance, most of the features that are to be found in a good trout stream. Flowing down a gentle mountain slope through thickets and rough woodland, it enters the valley and becomes a typical meadow stream. In this part of its course it is easy to follow. There are cleared banks and long stretches of open water, and the fisherman may stand on the bank and make long casts without difficulty. Up in the mountain, where the stream twists and turns among the rocks and under thick bushes, an entirely different kind of fishing is called for, because it is impossible to cast the fly with any freedom. The water is clearer and colder and the trout are more alert and difficult to approach.

We shall try to visit both parts of the stream—first the part through the meadows. Look for these features:

1. A riffle
2. A pool
3. A long stretch of open water
4. Sunken logs and brush
5. Flat rocks
6. Overhanging banks
7. Trees with roots in the water

In the mountain stream look for these features:

1. A riffle
2. A pool
3. A log-jam
4. Swirling water
5. "White" water

If any trout can be seen, notice their position. Can you explain why they lie with head up stream?

Where do they lie in a pool, and why?

What conditions will affect their feeding habits?

Can you see them in the riffles?

Can you find any near rocks or logs? What is their position in these places?

Why are bait fishermen more successful at night and early in the day than at other times?

At what time of the day should one try the fly?

Examine the Following Articles of Equipment

1. A fly rod

   It is made of six glued strips of bamboo. Weight may vary from four to six ounces, length eight to nine and a half feet. The degree in which it possesses whip and snap will depend mainly on the cost.

2. A single action reel
3. Enamelled line
   Both the line and the reel must suit the rod to give the proper balance. A light reel on a heavy rod gives an unbalanced outfit. A heavy line on a light rod will soon ruin the rod; a light line on a heavy rod cannot be cast with satisfaction.
4. Leaders
   Leaders are made of "silk-worm gut." They are made pliable by soaking, and they are used because of their lightness and their invisibility in the water. A leader may be four to six feet long—some prefer them much longer.
5. Artificial flies
   (a) Wet flies. These are used on the surface or under it and are of hundreds of patterns.
   (b) Dry flies. These are used on the surface only. By special construction and treatment they are made to float. Dry fly fishing is the fine art of the sport, and requires special equipment and much skill.
6. Leader box
7. Fly-hook (or fly-box)
8. Landing net
9. Six-inch measure
10. Creel

How the Fly Rod Is Used

Assemble the rod and attach the reel and line. Tie on the leader and the fly. Test the leader before casting.

When ready for the cast pull out as much line as the length of the rod. Throw this out in a straight line. From its position on the ground, lift it with a snap and stop the rod when it is in a vertical position. The line straightens out behind. Bring the rod forward with a quick motion almost to the horizontal, and as the line settles down give the rod a short upward twitch. This causes the fly to strike the water before the line.

—Prepared by Mark Kesel and Class,
Garfield Junior High School, Johnstown, Pennsylvania

Making the Necessary Administrative Arrangements. Most of these arrangements will be the direct responsibility of the teacher, yet many of them can be delegated to pupils. The first step is to have the permission of the school authorities to make the journey. Next comes the permission of the officials to be visited. If it is a simple outdoor trip to the park or other such public place no permission is needed, but most of the journeys will be otherwise. Along with this permission, it will be necessary to estab-

lish *rapport* to such an extent that the officials will actively co-operate. Will guides be furnished? What size groups can be accommodated? What are the most satisfactory days and hours for the visit? Just what will the class see? May certain officials be interviewed by student reporters?

It is imperative that the consent of the parents be obtained for their children to make the trip. This permission is similar to the consent which parents are usually asked to give for their children to participate in organized athletic contests, and to work with lathes, drill presses, power saws, planers, and other machinery in shops. Industrial plants often ask for waivers before visitors are permitted inside. Permissions to participate in school journeys may be for specific trips or they may be blanket permissions for a semester or a year. The school or the teacher will assuredly wish to be protected against liability for any injuries that might result to pupils. Only a few schools carry insurance for this type of protection. Anyway, no parent can sign away a minor's right to damages in case of gross negligence on the part of those in charge. If teachers act with prudence, exercising rational care and supervision, they are unlikely to be held accountable in the case of accidents.

In some instances, a few parents may volunteer to accompany the class and to provide part of the transportation. This is a wholesome consideration because it is evidence of the fact that the parents are in agreement with the philosophy of the school.

Since most arrangements for journeys are made well in advance of



These fourth-graders are looking for stones, which will later be cut and polished.

COURTESY OF GLENCOE, ILLINOIS, PUBLIC SCHOOLS

the actual date of the visit, the teacher should telephone or write the officials a few days before the trip takes place. This is both a courtesy and a good precautionary measure.

Modes of Travel and Methods of Financing Journeys. All the educational literature seems to indicate that an increasing number of school journeys are held during school hours. A small percentage is held at the end of the school day and a somewhat larger percentage on Saturdays. The so-called "long journey" involving a week or more, is spread over both school and nonschool time. Some journeys are taken during the summer under the sponsorship of a school, with principal or teachers in charge. School buses are often used for such trips if the school owns this type of equipment. Summer camps are frequently organized by colleges and universities for the purpose of on-the-spot study of geological formations, marine life, and plant ecology.

Six means of transportation are used. They are walking, bus, train, street-car or subway, boat, and private cars. The place, location, and distance are factors governing the means used.

Unless the journey is to a point within walking distance, there will be some expense involved. Who pays—pupil or school? Olsen contributes this:

> In most school systems, public funds are available for classroom instruction, for some documentary purposes, visual and auditory aids and for mimeographing and duplicating, as well as for limited postage and telephone calls. It is not yet common practice, however, to finance in similar fashion the school use of resource people, field interviews, excursions, surveys, extended field studies, camping, service projects, or work experience. Yet all of these vital educational approaches to the community involve some expense, and in this factor lies the third important obstacle confronting the community-minded teacher and class.[4]

The answer to the question of who pays, is, therefore, the pupil, one of the student organizations, or some community group, such as the PTA or the Chamber of Commerce. And, in the majority of instances, it will be the individual pupil. Unfortunately, this means that some pupils will be limited in their participation in any extramural program.

Doubtless most teachers pay their own expenses, yet this is poor pro-

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[4]From *School and Community*, pp. 308–9, by Edward G. Olsen. Copyright, 1945 by Prentice-Hall, Inc., New York.

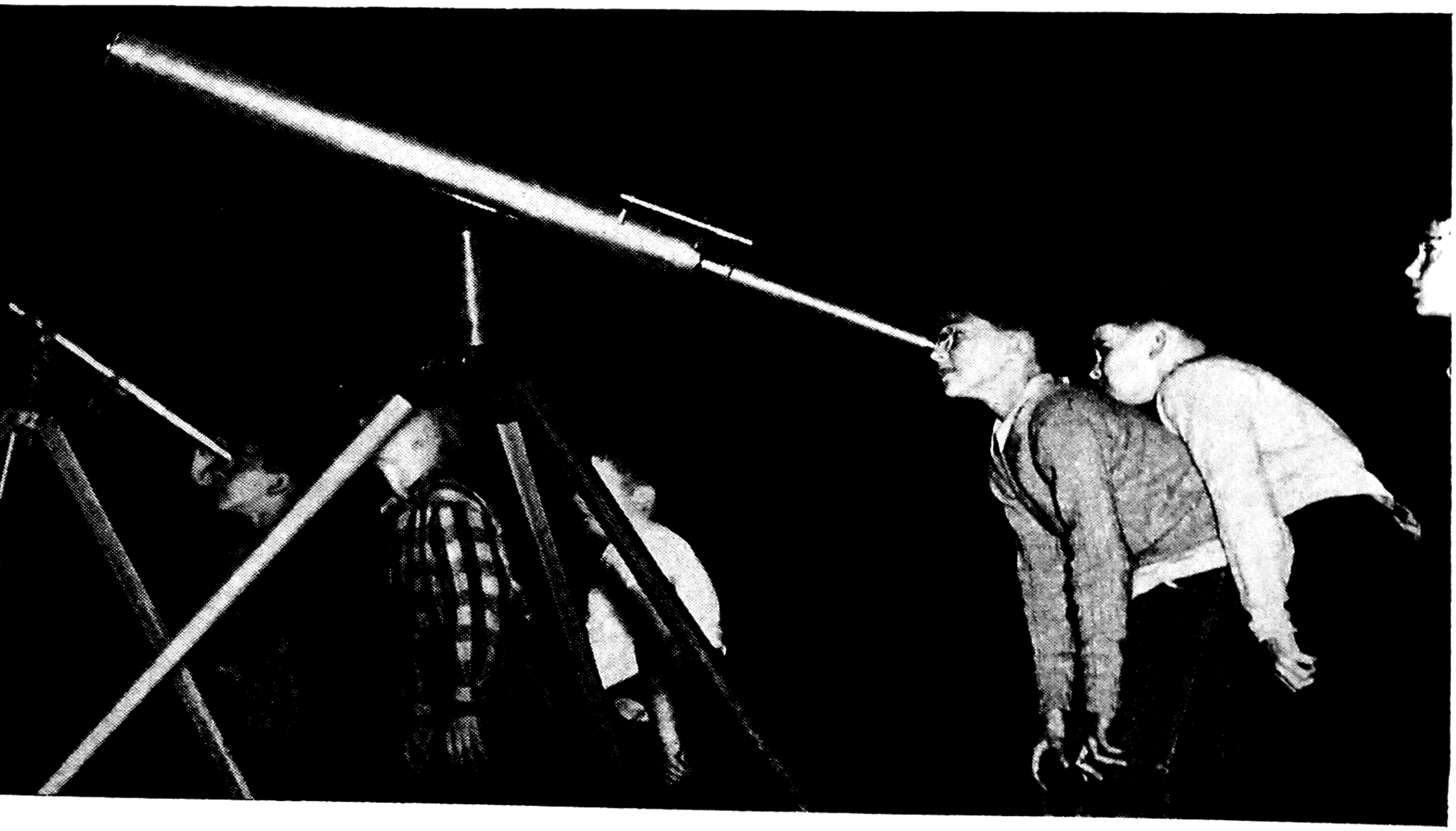
fessional practice also. If the school journey is to become a part of the regular educational program of the school, it should be paid for, as are other aspects of the program. Selke[5] places particular emphasis on the professional responsibility of the school in paying expenses of teachers; it is bad practice to "pass the hat" among the students to pay the expenses of the teacher.

"On the Spot." Needless to say, the school group should arrive promptly at their journey's destination. If proper planning has preceded the arrival, the formalities of "on the spot" organization will be short since both officials and pupils know exactly what they are there to get. It can be assumed that the pupils will conduct themselves with proper decorum, and will strive to make the greatest possible use of their visit. It is hoped that everyone in the group will have a fair chance to see and hear all that takes place. Question periods should be arranged if possible, or at least there should be opportunity for free informal questioning and discussion. Other activities of the students may include note-taking, sketching, and the taking of pictures. The possibility of obtaining posters, pam-

[5]Selke, A. C., "Standards for Educational Field Trips," *Journal of Higher Education*, 12: 386–87, October, 1941.

This class of boys is viewing the planets on a night field trip.

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phlets, and other printed material should not be overlooked. Samples or specimens should not be taken away except with permission.

Before starting the return trip, there should be a brief period for checking. All pupils should be accounted for and any equipment used on the journey should be checked and made ready for the return trip. There is no excuse for leaving behind lunch boxes, wraps, cameras, or other articles.

BACK HOME—THE FOLLOW-UP

One of the most important aspects of the school journey is the follow-up. There are numerous forms which the follow-up may take, the preferred one being that one which fits most closely the objectives of the trip. If the chief motives for making the trip were additional information of the factual type, then formal tests provide a check; but if the motives were the formation of social attitudes, appreciation, or emotional uplift, the type of follow-through will necessarily be quite different. If, for example, high-school English students have been taken to a nearby city to witness a professional production of *Hamlet,* it is quite possible to give a formal test on the play the following day, but there are other, and better ways of evaluating the worth of such an experience. Key points in the

As a follow-up activity these primary children have constructed a zoo in their classroom, with pictures and cut-outs.

FROM *Primary Activities,* SCOTT, FORESMAN AND COMPANY



evaluation of this trip would appropriately be noted in the desire of the class to discuss the play, actors, and the total production, the references made to the production during the days which follow, the general attitude toward Shakespeare and toward classic drama. Requests for another theatre trip or for a screening of a Shakespeare motion picture should be indicative of the arousal of interest.

The taking of notes, making sketches, and collecting of specimens fit certain types of trips, but for others they may be entirely inappropriate. Emphasis upon memorization of certain facts pointed out by the teacher may destroy the values of the trip completely; for example, the teacher should not say, "Remember this, boys and girls, because I'll ask you about it tomorrow," or "Did you get that in your notebooks?"

Trip evaluations may take place informally in departments other than the one directly responsible for the journey. Members of the English class which witnessed the production of *Hamlet* will use the experience for discussions, dramatizations, character analyses, or written compositions. In the clothing or sewing classes, the girls might contrast and discuss styles or materials. Every trip has numerous possibilities for providing integration between departments, and in providing students with opportunities for relating knowledge.

If the journey was successful in any degree, there will be questions and comments by the class. Full opportunity for thorough discussion should be allowed. It may follow that further study, research, reports, checking, and projects will result. Literature or specimens should be exhibited on a bulletin board or some other appropriate place. Often a report to the school assembly will be in order.

An appreciative note of some kind from the class to the officials of the school and to the officials visited is a courtesy. This note should not be a stereotyped letter, but a genuine expression of thanks. The letter may well contain individual student reactions.

The teacher should prepare a report for her professional file—a short but careful evaluation of the trip. This report may be of value to future classes planning the same or similar trips.

Correlated Developments. In addition to the major values of the school journey, there are several secondary ones which are grouped under this heading. Although subsidiary, these values may have great significance.

1. Writing Values: School journeys are interesting and should form the basis for numerous themes, essays, and compositions. This writing will carry over to news items prepared for the school paper, and sometimes to the local city papers. In some instances the account of a long and significant journey may be prepared for publication in a state or national journal. Historical society publications are interested in student accounts of trips to historical places. Trade journals and house organs also welcome similar accounts.

2. Radio Programs: The community will be interested in accounts of long trips. Local broadcasting stations will often accept a program built around an unusual trip.

3. Good Public Relations: The community should know what is going on in the schools. An effort should be made to show the values of journeys to the community, and if the matter is properly handled, community interest in the school is heightened. Student speakers or discussion teams may tell their story to service clubs, women's clubs, church groups, and other community bodies.

4. Establishment of Museums: A desire to start a museum at the school may have been prompted by the journey.

5. Establishment of an Arboretum or Greenhouse: A possible outcome for certain types of journeys.

6. School Camp or Lodge: Such a development has occurred in the cases of several colleges and schools.

7. Surveys: Journeys may open up new problems for discussion and analysis. Local surveys of a few blocks, a district, or a township can reasonably develop out of trips. In a specific instance, a social studies group became interested in housing as a result of several journeys into the slums and to housing projects. A socially blighted area was singled out for intensive study, and with the approval of municipal authorities and encouragement from interested teachers, a survey, documented with candid camera photographs and on-the-spot interviews, followed.

8. Drama Activities: Real possibility depending upon the nature of the journey.

Correct Utilization. Although nearly all departments might profitably use school journeys either occasionally or regularly, many do not. A brief survey of sixty-five secondary schools was made by the author to get some idea of what teachers are using school journeys and what the destinations

are. The departments making greatest use of the journey and the objectives most frequently singled out are indicated in the columns below in order of the frequency of mention.

Use of the School Journey by Departments	Objectives Most Frequently Chosen for Secondary-School Journeys
Science	Industries
Agriculture	Country—field trips
Social Studies	State, County, and Municipal Buildings
Industrial and Practical Arts	Farms and agricultural exhibits and demonstrations
Commercial Subjects	Museums
Art	Historical sites
Music	Commercial enterprises
English and Journalism	Theatres
Languages	Parks—local, state, national
Mathematics	Colleges and Universities
	Banking houses
	Housing Projects
	Hotels

RESOURCES FOR PLANNED LIFE-CENTERED EDUCATION

Every community is such a wonderful laboratory filled with so much material that it is very easy for much of it to be overlooked unless a systematic record is made of what is available. Teachers should prepare such records. These records will enable teachers to co-ordinate the course of study with the journeys so that they occur at the right season of the year. The various school departments can co-ordinate and integrate their trips better if prepared "Journey Lists" are available. There are many ways of preparing such lists but a convenient one is an outline of the type illustrated on page 402.

In line with the suggestion of inventorying the trip possibilities of a community, it is pertinent to point out a study made by Miss Frances G. Stanley,[6] a teacher in the Philadelphia schools. As a teacher of general

[6]Stanley, Frances G., *A Study of Available Excursions for the Teaching of General Science in and Around Philadelphia*. Master's thesis. Temple University, 1937.

Where to go	What to see	What to do	How to follow up
1. Logtown Gap	Cutover timber land	Make notes Sketches Comparisons of badly and properly logged timber lands Note vegetation Note fire hazards Note evidences of animal life	Reforestation Forest fires Logging methods Pulp and paper Lumber needs of the U. S. Talks by foresters Motion pictures Wild life

science, Miss Stanley became interested in the meagerness of laboratory equipment and material in her field and the cramped quarters in which students had to do their work. These conditions suggested the consideration of a more efficient technique for the teaching of the more practical aspects of general science. Accordingly, the school journey was chosen for study as a preferential method to supplement the traditional type of classroom instruction. Miss Stanley limited her community analysis to the area within a forty-mile radius of the city of Philadelphia. The survey was limited to towns with populations of twenty-five hundred and above. She found that it was possible to organize 348 different journeys all allied to the subject of general science. It was found that one-third of the 649 manufacturing firms contacted were willing to have classes visit their plants. On the single topic of "Air and Its Uses," it was found that forty-eight worth-while trips could be made.

Several city school systems issue bulletins dealing with excursion possibilities in the district. State Departments of Education have done the same thing. In Pennsylvania a comprehensive analysis of community resources was made. It was found that not a single county is without natural educational resources. Aside from industry, commerce, agriculture, and government buildings, the list of historical and cultural resources of Allegheny County shows the following:

Blawnox

Saunders Inn—at one time headquarters of Washington

Bridgeville

General Neville's home, 1785

Pittsburgh

University of Pittsburgh
Carnegie Institute of Technology
Pennsylvania College for Women
Duquesne University
Mount Mercy College
Carnegie Library—permanent collections and exhibits
Carnegie Museum—objects pertaining to natural science, archaeology, and the arts
Cathedral of Learning—nationality rooms
Phipps Conservatory—most complete in the United States
Historical Society of Western Pennsylvania—valuable collections of Americana, papers, etc.
Zoological Gardens
International House
Churches—Protestant, Catholic, Jewish, Greek Orthodox
The Block House, or Redoubt, built by General Henry Bouquet, 1764
Stephen Collins Foster Memorial Hall—contains collection of Stephen Foster's music
Ancestral home of the Mellon family—transported from Ireland
Brashear Memorial—Settlement House
Mellon Institute—one of the world's greatest centers for scientific research
Buhl Planetarium—complete in every respect

SUMMARY

The educational and cultural potentialities of the school journey are legion. Although generally recognized as a valuable learning aid, it has not been used as widely as it deserves to be. It has not been emphasized by the teacher-training institutions. Journeys are not units of study in themselves; they are means to an end. They provide more meaning for topics of study by enriching experience and vitalizing classroom work.

The values emphasized by the school journey are shifting from the mere acquisition of facts to attitudes, appreciations, and meanings concerned with social, economic, political, scientific, vocational and cultural phenomena. Teachers need not apologize for school journeys. If they are well planned, executed, and exploited, they will assist materially in attaining the educational objectives of the school. As a group, teachers are probably more keenly aware of the values of the school journey than administrators and boards of education. As yet, many schools have given no official recognition to the school journey, as evidenced by lack of

financial provisions and a reluctance to permit the journey to be taken during regular school hours. These are evidences of the lack of general acceptance of the school journey as an educational technique.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Make a list of the journey possibilities in your community specifically related to a particular topic or unit.
2. Make a local survey of practices regarding the following administrative aspects of journeys:
   (a) Insurance and liability waivers
   (b) Methods of meeting expenses
   (c) Transportation
   (d) The responsibility of making arrangements with authorities for visitations
   (e) Time placement of journeys
   (f) Duration of visits
   (g) Size of excursion groups
   (h) Reasons for excusing students for nonparticipation in journeys
3. Report on the present status of youth hostels in the United States.
4. Some teachers and principals maintain that school journeys are only a "sugar coating" of education. To what extent is this a valid criticism?
5. Historically, the school journey stems from the philosophies of such educators as Comenius, Rousseau, Pestalozzi, Froebel, and the sense perceptualists. To what extent has the modern philosophy of the school journey gone beyond the earlier philosophies?
6. Can interschool visits by students be properly classified as school journeys? What values lie in such visits?
7. Explain how the school journey may be integrated with a program of audio-visual aids.
8. To what extent, and under what circumstances, should students be allowed to make visits singly or as small committees without being accompanied by a teacher?

LABORATORY EXERCISES

1. The class should organize one or more journeys in accordance with the principles and techniques set forth in this chapter.
2. Show a motion picture (or still pictures) of a vacation tour taken by some member of the class. Discuss its educational possibilities.
3. The 16-mm. motion picture *Near Home* should be obtained and studied. This film, produced by British Information Services, is a documentary which shows how a progressive teacher in an English community effectively utilized the school journey to stimulate students. Other valuable visual techniques are shown in the film; chief among them is the exhibit. This film is distributed in the United States by British Information

Services, 30 Rockefeller Plaza, New York 20. Consult your local film library concerning rental.

4. Another film which should be screened and discussed is *The Field Trip,* produced by the Virginia Commission on Conservation and Development, Richmond, Virginia. This film was made to show parents and teachers the educational value of the field trip. It gives instructions on how to plan and make a trip. The film is 16-mm., black and white, and eight minutes in length. Consult your local library concerning rental.

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Part THREE



AUDITORY MATERIALS AND TECHNIQUES

The materials and techniques which constitute Part Three comprise those of standard radio and recordings as well as some which are just beginning to find their way into the schools. All of these have become significant social forces, and they are educational potentials. The discussion of television and facsimile is placed in this section of the book which deals with aural aids, although they are also visual. The problems of production and transmission of these newer media of communication are so closely allied to those of AM and FM radio that they belong with the aural instead of the visual. Most of the audio-visual textbooks of the past have either slighted the aural materials or have quietly left them out of consideration altogether. Part Three of this text is devoted to this rapidly developing field.



Chapter 16

THE RADIO—AMPLITUDE MODULATION

Among the auditory aids for school use, radio is by far the most important at this time. Its utilization as an instructional device is receiving widespread attention. Educators, Federal and state governments, and the broadcasting companies are co-operating to make radio a vital and dynamic factor in the educational program.

Radio, motion pictures, and the printed page are the foremost media of mass communication. Two of these media have been developed in the twentieth century. Their potentialities in the civilized world are recognized everywhere. Their influence in education is recognized more and more every year. The question of values is pretty well settled, but there are problems of proper utilization.

Historical Sketch. Radio is still in its infancy. Its invention is officially credited to Guglielmo Marconi. In 1895 Marconi caused Hertzian waves

to radiate from a transmitting antenna. In 1899 he sent these waves across the English Channel, and in 1902 across the Atlantic Ocean. These waves were named for a German physicist, Heinrich Hertz, who experimented with electric waves in the 1880's. Hertz in turn had built upon the researches of Clark Maxwell, an English mathematician, who as early as 1873 had concluded that high-frequency alternating currents, flowing in a circuit, would result in electric waves in the surrounding space.

At first the Marconi "wireless," or radio, was confined to telegraphic code, but by 1915 a group of American radio engineers succeeded in transmitting and receiving the human voice. Dr. Lee DeForest invented the audion—a three-element vacuum tube, which was further perfected by Dr. I. Langmuir. Other American inventors who hastened the development of early broadcasting were Professor Reginald Fessenden and E. H. Armstrong. Many other individuals aided materially in the early developments. In 1920 two commercial broadcasting stations, KDKA in Pittsburgh, and WWJ in Detroit, began regular broadcasting service. In this same year, these stations broadcast the returns of the Harding-Cox presidential election. A few years later a group of stage and picture stars donated their talents for a broadcast, and radio and stage were linked together from the standpoint of performers.

Business was quick to see the possibilities in radio for financial returns through the sale of receiving sets, although at first no one had the idea of selling advertising space. From 1922 to 1926 there was a mushroom growth, and nearly six hundred broadcasting stations were put into service by municipalities, universities, newspapers, corporations, and entrepreneurs. In 1926 radio broadcasting achieved national scope with the organization of national and regional networks.

As early as 1912 Congress passed an "Act to Regulate Radio Communication." The Secretary of Commerce was given power to assign a frequency wave length to stations applying for licenses. The broadcast band was from 500 to 1500 kilocycles. Some basis for the allocation of favored wave lengths had to be worked out. Consequently, the Secretary called the First National Conference on Radio in 1922. As a result of annual conferences from 1922 to 1925, the groundwork for future control of radio was laid. The principles evolved were: (1) control and regulation should rest in the hands of the people, (2) the ideals and interests of the people should be protected through controls, (3) freedom of speech

must be guaranteed, and (4) broadcasting would have to be financed by private enterprise. The Secretary of Commerce was assigned the duties of (1) classifying stations, (2) allocating wave lengths, (3) fixing call letters, (4) allocating power, (5) setting the time of operating, (6) determining the general character of broadcasts, and (7) placing a time for license expiration.

So rapid was the expansion of radio that in 1927 Congress established the Federal Radio Commission to curb abuses and bring order out of confusion. This Act restated the American doctrine of free speech. Again, to keep pace with this expanding giant, the Communications Act of 1934 replaced the old Commission with the Federal Communications Commission. This Commission was given power over radio, telephone, telegraph, and cable. It not only has power to increase the number of broadcasting stations and assign frequencies, but it promotes experimentation along such technical lines as frequency modulation and television.

But American radio control policy is still evolving. Two schools of thought are quite vocal; one calls for more government control, and the other for less. Both ask for a "free radio." In one case this seems to mean free from advertising domination, and the other free from governmental interference.

Per thousand population, the United States leads all countries in the number of radio receiving sets. Following the United States, the ten leading nations, in order, are: Denmark, Great Britain, Sweden, Holland, Australia, Germany, Iceland, Switzerland, Canada, and Belgium. The organization, administration, and control of radio varies widely in the nations of the world. In general four main schemes obtain: (1) private station ownership and sponsorship of programs with a mild government regulation of air channels, (2) private ownership and program sponsorship but with a government regulation which concerns itself with types of programs, preferential consideration for certain programs, and with some reserve authority to be used, when and if needed, (3) government control with authority delegated to licensees who in turn direct all programs, and (4) absolute control by the government. The first and second systems explain the radio policy of the United States, the third is typical of Great Britain, and the fourth is exemplified by the totalitarian countries.

In the United States receiving sets are not licensed, although most foreign countries follow such a practice. In Great Britain, for example,

according to the British Broadcasting Company, a receiving set is subject to a license fee of ten shillings.

GENERAL INFLUENCE OF RADIO

For five hundred years the goal for print has been admittance to every home. In a few short decades radio in the United States had all but achieved this goal. According to the 1940 Census there were 34,948,666 families in the United States, and in 1948 the radio industry reported that 34,000,000 families have at least one radio receiving set. Thus, the percentage of families having radios is well in the nineties. And even this is not the total picture because the total number of radios in use is 75,000,000, distributed as follows:

Homes with radios	40,000,000
Secondary sets in these homes	19,000,000
Business places, institutions, etc.	5,000,000
Auto radios	11,000,000
Total sets	75,000,000

It is estimated that the average daily service of a set is slightly more than five hours. In order to supply these radio sets with programs covering every hour of the day, 960 broadcasting stations each send out 500 programs weekly. Each station is on the air for an average time of sixteen hours daily. The audience peak is at eight o'clock in the evening, at which time 75–85 per cent of the receiving sets are in use.

Who listens to the radio? If nine out of ten families have radio receiving sets, the answer to this question is, quite obviously, nearly everybody. Although this is true, there are vast differences in the amount of listening and in the effect upon various listeners. The Princeton survey found that among the higher educational levels people read more, but listen to the radio less than the average person; an inverse relationship being noted between educational level and amount of radio listening done.

Although educational level and economic status are not necessarily synonymous, there is a reasonably high correlation between the two. Many people who do not own books nor subscribe to a magazine or newspaper rely solely upon the radio to keep them informed on current events. But to what do they listen? Again the Princeton survey showed that the

more intelligent and informed people listen to forums, political discussions, news interpretations, and other serious or cultural programs. The less informed listen to the dramatized serials, swing music, and an assortment of claptrap. The informed select their radio programs with care; the uninformed appear to leave the circuit open for everything which comes along. Their radio is tuned in nearly twice as many hours per day as the radio of the other group. Seventy per cent of the families which have radios listen to the news, but this listening has not decreased interest in newspaper reading; in fact, radio listening appears to stimulate interest in reading. Book reviews on the radio generate interest in book reading, a fact which librarians have observed repeatedly. Survey investigators found many people saying, "Listening is easier but you get more out of reading," "You can concentrate more on reading," and "You get more facts and arguments out of reading." College graduates listen least of all, high school graduates next, and those who did not reach high school listen most. This last group, too, listens very little to serious and cultural offerings, symphonic music, opera, discussions of world affairs, and programs of an educational character. Radio, then, although it reaches nearly every home, has not taken the place of the newspaper nor is it likely to replace reading as a means of acquiring knowledge.

LISTENERS' HABITS AND TASTES

Outside the classroom most people consider the radio as diversion or entertainment rather than as education. Educational aspects are secondary, although a few people naïvely believe that listening to quiz programs enhances the listener's knowledge. With many families the radio is tuned in and left on for long periods of time, while the members of the household eat their meals, read, play bridge, converse, or entertain. Listening under such conditions is decidedly passive. Of course listening of all types is an important avenue for learning, but active, intelligent, home listening to the radio is apparently much neglected.

Listening is decidedly a "life activity." In a doctor's dissertation at the University of Michigan, Paul T. Rankin noted that people listen three times as much as they read "in life," but in school the listening time is only about one sixth of the reading time. His findings are:[1]

[1]Rankin, Paul T., in *Education on the Air*, edited by Josephine H. McLatchy, Yearbook of the Institute for Education by Radio, p. 347. Ohio State University, Columbus, 1934.

Method of Communication	Use in Life (Per cent)	School Emphasis (Per cent)
Listening	45	8
Reading	16	52
Talking	30	10
Writing	9	30

Quite obviously the school emphasis is not closely associated with life activities.

Since listening is engaged in so widely, it is significant to know some of the listeners' habits and tastes. First, at what time of day does this listening take place? Summarized, various surveys present the following list of preferences:

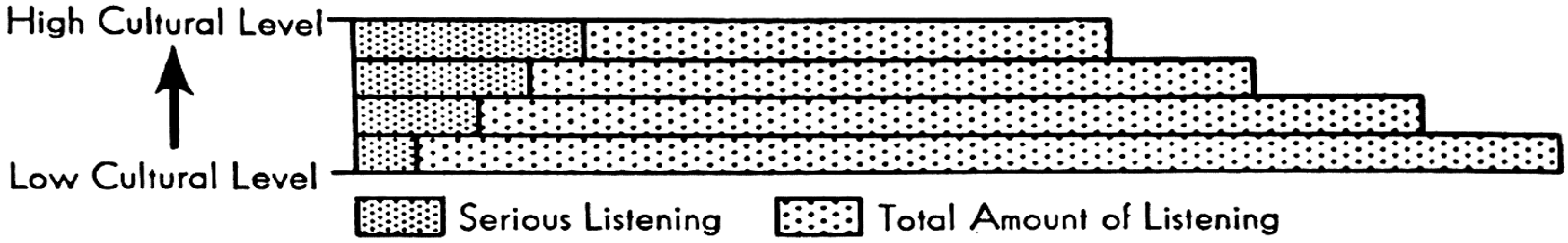
Order of Preference	Time of Day
First	7– 9 P.M.
Second	9–10 P.M.
Third	6– 7 P.M.
Fourth	10–11 P.M.
Fifth	12– 1 P.M.
Sixth	5– 6 P.M.
Seventh	11 P.M.–midnight
Eighth	10 A.M.–noon
Ninth	8–10 A.M.
Tenth	3– 5 P.M.

The daytime audience is preponderantly women, but in the evening the proportion of men and women is about equal.

Types of programs preferred follow the order listed below.

Program		Median Rank-order
Music		2.5
Popular	2.0	
Classical	4.5	
Comedy		2.5
Dramatic programs		3.5
Sports broadcasts		4.0
Talks (general)		6.0
Religious programs		6.5
News and market reports		7.0
Educational programs		7.0
Children's programs		7.5
Special features		8.5
Women's programs		10.0

Research has shown that there is a positive correlation between radio programs listened to regularly and reading level. The whole matter of tastes, program preferences, and cultural levels is summarized in the accompanying graph, which shows the correlation between cultural level and serious listening.



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General Listening and Serious Listening on Different Cultural Levels (Schematic)

Further light is shed on listeners' habits and tastes by a questionnaire study of 1,075 people in New York State and New England, so selected as to achieve the most representative sampling of this area as to size of community, age, sex, and cultural levels. The study represents a fair cross-section of the American population.[2] The findings of this study may be summarized briefly as:

1. Younger listeners do more "blind" tuning in than older listeners.
2. "Favorite stations" or previously announced programs nearly always determine programs heard.
3. Network programs are preferred to local broadcasts.
4. News via radio is preferred to news via newspaper.
5. Speeches over the radio are much to be preferred over reading the speeches in the papers.
6. Nearly 90 per cent prefer music to spoken material over the radio.
7. Listeners like to hear speakers with whom they agree.
8. From two-thirds to three-fourths of those who listen to the radio are engaged in some other activity simultaneously.
9. Face-to-face lectures, sermons, and concerts are preferable to the same thing on the radio.

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[2] Cantril, H., and Allport, G. W., *The Psychology of Radio*, pp. 98–104, Harper and Brothers, New York, 1935.

10. Advertising is not popular with the average listener, yet only about one-fourth of the listeners would be willing to pay a small tax so that advertising might be abolished.

INFLUENCE OF OUT-OF-SCHOOL RADIO LISTENING ON CHILDREN

Surveys indicate that well over 90 per cent of the school children have radios at home. Perhaps many of the others listen to radios of neighbors and friends. Data concerning the amount of time which children spend with the radio at home appear to vary considerably depending upon day of week, season, number of books in the home, and the socio-economic level of the home. An estimate of the hours spent before the radio for children below high-school age is one and one-half hours per day. Many children, either by preference or through necessity, study with the radio in operation, a practice which teachers do not recommend.

Listening Habits of Younger Children. Children appear to begin to listen to the radio regularly at about the age of five or six. By the time children reach the third or fourth grade they are confirmed radio fans. These vicarious leisure-time activities compete with such firsthand activities as sports and games for the children's time. By the age of sixteen the transition to the secondhand type of activities is almost complete.

In general radio interests of children follow closely those found in surveys of several thousand children of New York City. Programs which stand high in favor contain a large element of adventure, crime, and comedy, although many children prefer popular programs planned for adult audiences. As yet, it cannot be said that these programs represent the spontaneous interests of children. It may well be that these interests are the result of the fare which the broadcasting stations have given them.

It is difficult to connect children's ages with program preference, but a few trends do seem to stand out. Programs with fantasy and make-believe decline in favor about the age of nine. Thus, programs built around nursery rhymes or adaptations of folk tunes begin to give way around eight or nine to a more subtle variety of drama, news broadcasts, and more serious and realistic programs. Children enjoy hearing their names read over the radio, and quite commonly respond to broadcast station offers of prizes for box-tops and the like.

In a panel discussion of children's programs at the Thirteenth Annual

Conference of Education on the Air, Mr. Lyman Bryson pointed out that much of what has been written and said about children's tastes and interests is mere guesswork and is often based on what adults wish their interests were. He pointed out three illusions, namely, (1) the illusion of parents: that they can keep children from growing up and that they must protect the child against life, (2) the illusion of teachers: that the effect they wish in children stems from their teaching activities, (3) the illusion of reformers: that the new world they wish to create will be pleasing to them if they get it.

All of this leads to the statement that radio must be considered as an integral part of the environment in which children live. This does not mean that there should not be strivings to better the environment, but that a more thoroughgoing and realistic understanding of the psychology of children, public opinion, and of the effects of radio are needed.

Listening Habits of High-School Students. Numerous analyses have been made of the out-of-school listening habits of high-school students. They do not differ particularly from those of younger children except as they reflect the widening interests of older adolescents. Practically 100 per cent of them listen, and their average listening time per day is longer than that of the younger children. Dance music, crooners, skits, and

A news broadcast is correlated with current-events magazines, bulletins, and maps. These students are getting a comprehensive understanding of history in the making.

COURTESY OF ATLANTIC CITY PUBLIC SCHOOLS



sports rank high in types of programs preferred. Nearly half of the high-school students report that they listen to the radio while they do their homework.

Home Listening Values. Children must inevitably be influenced by their out-of-school radio listening. Then the question should be raised, has the school any responsibility for directing and guiding home listening? Most informed educators think so. But how? A policy of belittling unsatisfactory programs is not likely to be of great value. A better approach seems to lie in stimulating positive, constructive interests in worth-while programs. School discussion, reports, and even assignments involving home listening will direct the child toward that which is worth while. Correlation with schoolwork will focus the child's home listening on programs of proved educational and recreational value. Schools and teachers very generally encourage pupils to do collateral reading at home. If this reading serves to enrich the school's curricular offerings by arousing pupils' interests, providing new points of view, adding appropriate background, or motivating pupils, so also could home radio listening. Of course, the radio-equipped school can do much more toward educating children in how to use the radio, how to select and evaluate programs, and how to become the master rather than the slave of radio habits. Further studies of the values of incidental learning through the use of the radio along the lines of amount and types of informations, concepts, attitudes, and appreciations are badly needed.

UTILIZATION OF RADIO IN THE SCHOOLS

Up to this point the discussion of radio as a social and cultural force has not involved the school, except indirectly. It now becomes necessary to ask, should the school interest itself directly in this new medium of communication which has made such outstanding growth in the last quarter century?

The world outside the classroom is moving at an ever-quickening speed. Can the school keep pace? Many people believe that raising the material standard of living in the world lies in the use of machinery; also, many people have the notion that equal educational opportunity lies in the schools' adoption of the scientific aids to learning. The curriculum in most schools is larded with preserved culture and shows little recognition of the culture which exists outside the classroom. It is easy to agree with

Dunham that a school without a radio is an educational tragedy in this mid-twentieth century.[3]

Apathy Toward Radio in Schools. It may be unfair to accuse the schools of apathy toward radio, since broadcasting was begun in 1920, and is, therefore, only twenty-nine years old. Radio influences, however, are so far-reaching and the values so great, that there is reason to ask why they have touched so few schools in a really vital way. Schools are charged with the responsibility of supplying their students with basic knowledge and techniques, but they must also create a deep understanding of the social, political, and economic forces which play upon society, as well as an appreciation for the creative genius of man and for the beauties of nature. Much of this comes under the general heading of the enriched curriculum. That schools lag behind social and economic developments is no new phenomenon, but the reasons for this lag are important.

Chief among these reasons is the fact that schools simply do not have the equipment whereby they can receive and utilize broadcasts as a part

[3]Dunham, Franklin, "Radio, The Modern Aladdin's Lamp," *The Grade Teacher*, p. 61, June, 1948.

School children in Denver received homework assignments by radio when coal shortages closed the city's schools.

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of their educational program. Probably no one in the United States knows exactly how much radio equipment the schools own, or to what extent they use what they have. Numerous surveys have been made but they are soon out of date, and most of them are incomplete even at the time they are made. One exception to this statement seems to stand out—the Ohio Evaluation of School Broadcasts. This report showed that nearly three-fourths of the Ohio schools lacked the basic equipment to use radio programs satisfactorily. The situation in Ohio is probably typical of the school situation throughout the country. When queried, 1,894 principals gave the following reasons for not using radio:

	Number of Schools	Per Cent
No radio receiving equipment	947	50.0
School schedule difficulties	443	23.4
Unsatisfactory radio equipment	355	18.7
Lack of information	265	14.0
Poor radio reception	210	11.1
Programs not related to curriculum	205	10.8
Classwork more valuable	195	10.3
Teachers not interested	130	6.9
Programs not suitable for grades	110	5.8
No programs available	55	2.9
Students not interested	49	2.6
Contrary to school policy	38	2.0

Summarized, these replies indicate that reasons involved were lack of equipment, schedule difficulties, indifference and lack of interest, lack of relationship between broadcasts and school courses, and lack of teacher information about broadcasts. Of the reasons listed above, Woelfel and Tyler say:

> Yet only one of the twelve reasons is not remediable within a school. Radios can be obtained, time schedules can be changed, courses of study can be altered, teachers can become interested—provided worth-while programs are available for school listening . . . here we wish to point out that these reasons, valid as they may have been as explanations for a single year, do not explain the widespread neglect of radio in public education.[4]

Function of Radio in School and Classroom. Radio's contributions to the general and specific objectives of education are many and varied.

[4]Reprinted by permission from *Radio and the School*, pp. 3–4, by Norman Woelfel and I. Keith Tyler. Copyright 1945 by World Book Company.

The array of functions is so impressive that it would be easy to be carried away by what radio may do, and to fall into thinking that this medium of communication is the panacea which will make education at once easy and efficacious for every boy and girl.

The report of the Evaluation of School Broadcasts has so succintly summarized the functions of radio that a portion of the report is reproduced here:

Table V. Value of School Broadcasts in Terms of Educational Objectives[5]

	Reactions of Supervisors (47) and Teachers (322)				
	Always Helpful %	Generally Helpful %	Sometimes Helpful %	Seldom Helpful %	Never Helpful %
Informational Background (Objectives dealing with the acquisition of facts, information, concepts, and principles in various fields of subject matter)	60.8	30.7	4.7	0.7	3.0
Attitudes and Appreciations (Objectives dealing with the quality and consistency of beliefs, convictions, attitudes, and general orientation)	36.3	50.0	7.2	1.1	5.4
Interests and Self-Motivation (Objectives dealing with building continuing interests and self-motivated purposes)	35.8	47.8	12.3	0.7	3.4
Social Behavior and Personal-Social Integration (Objectives dealing with emotional and personal values and balance, sense of humor, facility in getting along with others, and developing a personal philosophy of life)	37.9	34.0	16.8	5.3	6.0

(continued on page 421)

[5] *Ibid*, p. 37.

	Reactions of Supervisors (47) and Teachers (322)				
	Always Helpful %	Generally Helpful %	Sometimes Helpful %	Seldom Helpful %	Never Helpful %
Creative Expression (Objectives dealing with writing of original music, poems, stories, scripts, etc.; with dramatization, oral expression, and illustration of literary excerpts through other art media; self-purposed experimentation and investigation)	34.7	29.5	24.9	4.6	6.3
Critical Thinking and Discrimination (Objectives dealing with the quality of the thinking and study in a particular field of subject matter and ways of arriving at conclusions and applying principles and standards to debatable issues)	27.7	42.4	21.8	2.6	5.5
Skill and Techniques (Objectives dealing with facility in apprehending meanings, expressing meanings, using "tools" of learning and conventionally accepted "tools" peculiar to the contents of a subject-matter field)	33.9	34.6	22.6	2.7	6.2

Table V tells its story so well that little need be said about it. From two thirds to nine tenths of all the replies are in the first two columns, "Always Helpful" and "Generally Helpful." The seven objectives or values included in the table may be expanded or regrouped, at will. For example, the contributions which radio can make to the school and education are discernible in its enrichment of the course of study. Not



With a microphone pinned to his shirt, this pupil in a laboratory school prepares scenery for a school play. Recordings are made of all class proceedings to determine best teaching methods.

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only does radio provide informational background, but it brings listeners into closer touch with the world; it provides a vicarious opportunity for pupils to know the great personalities of contemporary times. Opportunities are provided for pupils to hear all sides of controversial issues, and to break the shell of provinciality. This sort of thing gives students a sense of participating in the affairs of their community, the nation, and the world. Pupils need not pattern their thinking in narrow channels. They will hear the best and finest in drama, music, speech, and ideas. This cannot but help provide dynamic motivation.

Curricularly, the radio provides significant opportunities to sharpen the pupils' abilities to do critical thinking and to make intelligent judgments. Attitudes and tastes will expand. Creative expression along any one of several lines will follow naturally. New skills can be developed, and relationships between bodies of knowledge can become more meaningful.

Teachers are not left out when the values of the radio are assessed. The radio should be a challenge to dogmatic teaching and a sounding board for testing new ideas. Students who hear ideas on the radio contrary to statements made by teachers are likely to tell the teachers so. Levenson, formerly Directing Supervisor of Radio for the Cleveland Schools, be-

lieves that radio is an effective means of presenting new models in teaching technique. Radio can assist in demonstrations and supervision in instances where the school system has its own broadcasting system. Because the radio has no traditions of bookishness and formalism, it can assist materially in breaking the academic lock step.

Radio also provides direct content for study. As content, it is easy to see that themes and class talks can be fashioned about this medium. It is a fertile topic for research and investigation. Units on radio may well be formed in courses in English, the social studies, and science, and some schools are offering entire courses in this field. Colleges and universities give such courses regularly, but, in high school, aside from courses in radio construction and repair in the vocational work, full radio courses are rare. Western High School in Detroit has developed an experimental radio course which, to be sure, is on an elective basis. Consider this outline of the course:

A. THE PHYSICAL SCIENCE BEHIND RADIO

B. THE DEVELOPMENT OF RADIO
1. From scientific standpoint
2. From manufacturing standpoint
3. From broadcasting standpoint

C. BROADCASTING
1. The radio station
2. Types of broadcasts
    a. Simple broadcasts
    b. Chain broadcasts
    c. Transcribed broadcasts
3. Types of programs
    a. Newscasts
    b. Spot broadcasts
    c. Talks
    d. Audience participation
    e. Musical
    f. Dramatic
        (1) Scripts
        (2) Acting
        (3) Sound effects

D. USES OF RADIO
1. Advertising
2. Aviation

3. Education
4. Entertainment
5. In war
6. At sea
7. Miscellaneous

E. GOVERNMENT ADMINISTRATION OF RADIO

1. In United States
2. In foreign countries

F. INTERNATIONAL RADIO

G. SHORT-WAVE RADIO

H. TELEVISION

I. RADIO AS A VOCATION

Superintendents know the value of radio in a good public-relations program, and there is abundant evidence to the effect that radio can correlate school and home study activities through assigned home listening. A new use for the radio has been found to serve handicapped and homebound children. The Indianapolis Schools planned such a radio series under the title *School Ship of the Air*.

SOURCES, TYPES, AND SELECTION OF PROGRAMS

The value of radio, as of every other educational aid or method, depends upon the way it is used and the results obtained. Attention will first be directed to broadcast sources, types of programs, and approved ways of selecting programs to achieve the objectives sought. The discussion will then turn to actual techniques of classroom utilization.

Networks, State and Regional Broadcasts, and Local Broadcasts. Broadcasts suitable for school use originate in one of the three above-mentioned sources. The contributions and advantages of each have certain qualities which need brief explanation.

Nation-wide network school broadcasts have the widest scope of all, because they can be heard in every locality. In this very aspect lies one of their greatest values. Since programs are heard in all localities—urban and rural, industrial and agricultural, mountain and plain, cultured and backward, wealthy and poor—they act as a common educational denominator unifying educational philosophy and subjecting all listeners to the same standards. The mosaic character of the American educational system is too well-known to dwell upon, and any unifying or cohesive force is welcome.

Network broadcasts usually do not follow subject or departmental lines; therefore, the material tends to bring out relationships and to offer great possibilities in correlation of subjects. This matter was mentioned earlier as one of the values which radio can contribute to educational objectives. This characteristic of network broadcasts is not limited to the networks, because it may also characterize many state and local broadcasts. Some educators seize upon this characteristic as the basis for the complaint that broadcasts do not fit into the courses of study for particular grades and subjects. Such criticisms are stuff and nonsense.

A third characteristic of network broadcasts is the unusually high standards of performance. Networks have the best of facilities for research, the best performers, announcers, sound effects, orchestras, techniques, and technical equipment. Speech and diction of performers and announcers are usually of good quality. This matter of speech is most important. Some regional areas in the United States, even the schools of the region, speak a dialect or use inflections which vary widely from the standard English spoken throughout the major portion of the country. Students in schools in these areas will have an opportunity to hear more standard language.

The world's greatest voyage of discovery is being relived by these pupils as they listen to a broadcast, "Columbus Sails."

COURTESY OF ST. LOUIS PUBLIC SCHOOLS



A fourth characteristic of the networks, and one closely related to the third, lies in the fact that they use a large number of outstanding national and world personalities in their broadcasts. This enables students to hear men and women in important positions, world travelers, "name bands," symphony orchestras, Metropolitan opera, and renowned actors and actresses.

It should be made clear that not all stations affiliated with a network carry all programs; thus, it may happen that the schools are short-changed by their nearby station even though it is a network affiliate. Such a condition usually reflects the fact that the schools in the particular area are doing nothing with radio, hence the indifference of the station to this type of broadcast. If schools become active consumers of educational programs, the local station is likely to be co-operative.

State and regional broadcasts are much alike in that they cover a limited area. There is a definite need for this type of broadcast service. State school broadcasts usually originate at the state university, state agricultural college, or at the state capitol. A few of the state departments of education have been instrumental in organizing and maintaining a state school of the air. Outstanding state schools of the air are found in Ohio, Texas, Wisconsin, and Minnesota.

In the Pacific area the Standard School Broadcast, sponsored by the Standard Oil Company of California, functions as a regional school of the air. This program is one of the truly fine school broadcasts; it is free from advertising, has exhibited unusual stability over the years (established in 1928), and has furnished free manuals and guides to teachers so that the broadcasts might produce maximum learning on the part of the listeners.

Local school broadcasts consist of school-operated stations or programs produced by local teachers and administrative officers in conjunction with privately operated stations. The number of schools operating regular or consistent programs is probably not more than fifty.

The history of school broadcasting for classrooms is interesting. School systems have had their ups and downs with radio. In some cases it has flourished, but in others it has been discontinued. Administrative changes both in the schools and in the local stations have had important bearings on the stability and value of the broadcasts. In some instances the broadcast series have been weekly, others daily; some stations have maintained programs more or less throughout the school day, others for periods of

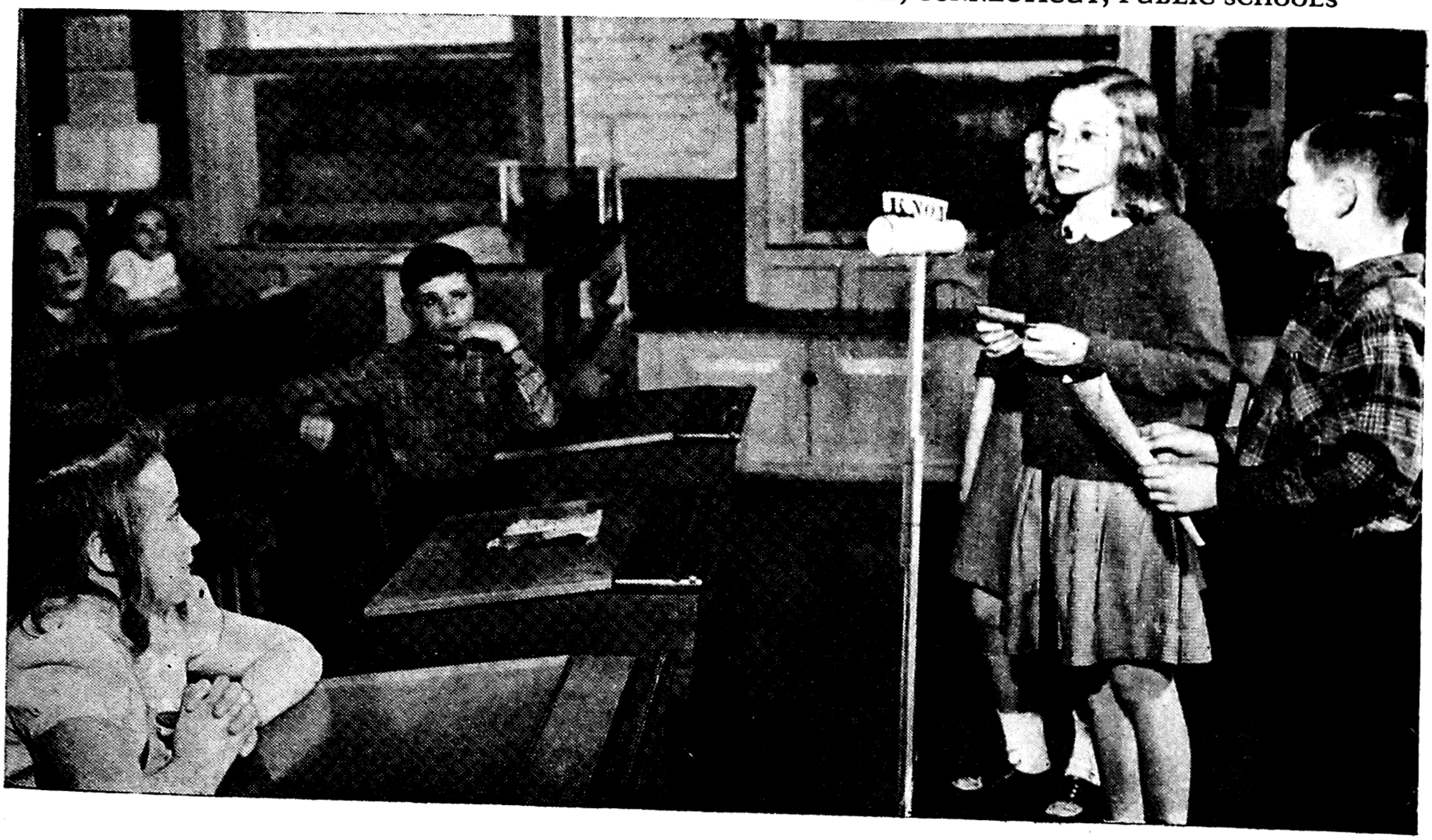
fifteen or thirty minutes. In this connection, Cleveland, Chicago, and Pittsburgh will be discussed in detail later in the chapter.

Types of Programs. It is well to keep in mind that there are two main types of radio programs: sponsored and sustaining. A sponsored program is one that is paid for by a commercial company for the purpose of selling its product. In some cases the advertising is obnoxious, and the program is spoiled by interruptions and nauseating sales talk. In other cases the name of the sponsor is given in a dignified way and merely identifies the sponsor, for example, the Standard Oil Company of California in the Standard School Broadcasts. Some schools forbid the use of sponsored programs during school hours, just as they forbid all sponsored motion pictures. There is reason enough for such action, yet much valuable educational material may be lost. It seems legitimate for a school to use selected sponsored programs, provided it is perfectly clear to everyone that the school endorses no products, and the views expressed on the program are those of the sponsor.

Sustaining programs are those presented and paid for by the broadcasting station without any advertising. Programs produced by educational organizations, clubs, civic and health groups, and churches are also classi-

Simulated programs provide almost as much challenge to these sixth-graders as "live" programs.

COURTESY OF WEST HARTFORD, CONNECTICUT, PUBLIC SCHOOLS



fied as sustaining, although in a way the organization producing the program is advertising itself. On the whole, school officials prefer sustaining to sponsored programs.

In classifying radio programs—sponsored or sustaining—for school use, one finds that there are three categories:

1. School programs: those specifically broadcast for school audiences
2. Nonschool programs: programs which have good educational material suitable for school use, but broadcast for general public consumption during regular school hours
3. Out-of-school programs: broadcasts before and after school hours which have material supplementary to the school curriculum

School programs are planned specifically for school utilization and are broadcast during school hours. These broadcasts are known to teachers well in advance, and are usually supplemented with teachers' guides and other printed material. School programs are broadcast on nation-wide networks, state or regional chains, or on local stations only. These programs are usually arranged in series and may continue from a week or two to the entire school year. School programs are ordinarily of the sustaining variety.

Nonschool programs may either be in series or single "spot" programs —sustaining or sponsored. They are prepared for general audience consumption (usually adult), but, since many of them are satisfactory for school use, teachers make them the basis of regular classroom listening. These programs usually are not supplemented with guides and manuals.

Out-of-school programs are those of every type which occur during out-of-school hours. Children listen to the radio during the evening. The school can direct this listening to a certain extent by discussions in the classroom of programs heard, evaluations and judgments of programs, and discussion of radio standards.

Forms of Programs. Programs are broadcast in any one of several forms, or combinations of forms. They are:

Straight talk
Interview
Panel; round table
Actuality
Quizzes
Foreign "pickup"
Classroom "pickup"
Forum; debate
Dramatization
Music
Demonstration lesson

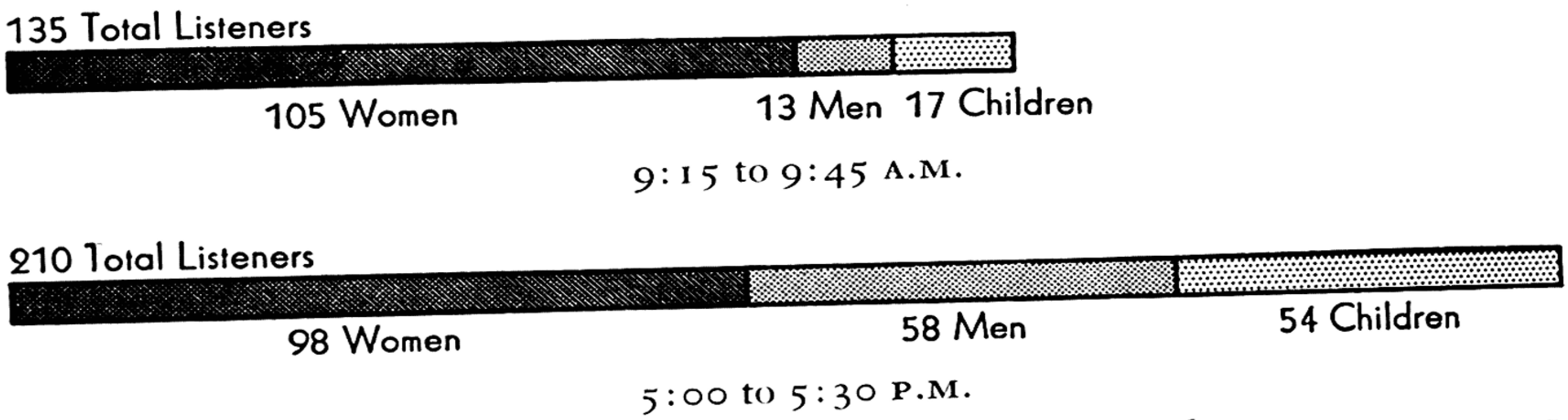
Each of the above forms has advantages and limitations, but each serves a useful purpose. Some of them quite naturally lend themselves to certain subjects better than to others. All require planning, and some, rehearsal. A good script is indispensable. Each of the above forms seems sufficiently self-explained by title that nothing further need be said, except in the case of "actuality." This refers to an "on-the-spot" broadcast as the events take place, such as the opening of a Congress or the description of the parade and welcome extended to a great hero or international personage. Scripts cannot be prepared for such a broadcast, and therefore the possibilities for waste of time, unfortunate incidents occurring, or poor grammatical usage, are great. Ordinarily these broadcasts are entrusted to capable and experienced broadcasters and are well-handled. They are characterized by reality and often by vivid emotional appeal.

What Programs Are Available? Teachers frequently say that they do not use radio because they cannot find out what is available, or whether particular broadcasts will have any value for their classes. Such an excuse is not to be taken seriously, because there are excellent means of finding out what is available. The daily and weekly papers carry the radio schedules, although one cannot always know from the title what the nature of the program will be. They are, however, ordinarily self-explanatory. The educational series, such as the schools-of-the-air, national, state, regional, or local, are announced well in advance and are supplemented by manuals, guides, outlines, and other printed materials which are available, free or at small cost, from the broadcasting station. Schools which make a planned use of the radio are likely to have a director of audio-visual aids or a committee which is charged with the responsibility of mimeographing lists and schedules of suitable programs.

It is especially easy to know what is available from the four nation-wide networks. Their programs are popular and the companies issue complete program lists upon request. They maintain open mailing lists and teachers who request that their names be placed on these lists receive announcements regularly. *NBC—This is the National Broadcasting Company* is a monthly bulletin which classifies its programs under the headings: public affairs and news, music, education and the arts, and religion and special features. Programs are listed by days of the week and hour of broadcast. In addition each bulletin contains a feature article and a column entitled "Behind the Scenes—Personality Series." The

Columbia Broadcasting System issues a bulletin, *CBS Listeners' Guide,* which notes items of school interest. The American Broadcasting Company and the Mutual Broadcasting System issue newsletters and bulletins. *For Your Information* (formerly Blue Network) provides much information of a general character. The Mutual Broadcasting System has not tried to provide a school-of-the-air, but it has many educational programs which originate in affiliated stations. *Scholastic Teacher* magazine lists selected FREC-approved programs every month from all four networks.

For eighteen consecutive seasons (1930–1948) the Columbia Broadcasting System maintained the American School of the Air as an educational service. This program was beamed principally for junior and senior high schools. Up to 1945 the program was heard from 9:15 to 9:45 A.M. As a result of a policy study in 1945, the program was shifted from an in-school hour to an out-of-school hour—5:00 to 5:30 P.M. Audience studies made both before and after the change in time showed the amazing fact that there were 56 per cent more listeners during the out-of-school hour, and, as might be expected, some shift in the character of the audience. The accompanying graph brings out both of these conditions very clearly:



SOURCE: *CBS Listener Diary Study,* WASHINGTON, D. C.

American School of the Air Listeners per 100 Families

It seems paradoxical, but the above data indicate that some schools actually insulate against school broadcasts. The reasons for this lie in such factors as: (1) uncertain equipment and reception, (2) teacher loads too heavy, (3) prejudice, and (4) inertia and lack of understanding of the educational values of radio. Anyway, after the close of the 1947–1948 School Series, CBS discontinued the School of the Air. The opinion was expressed by the CBS Director of Education that the only way to handle integrated in-school broadcasts is for the school system to handle its own broadcasts.

Although this particular educational series has been discontinued, CBS is continuing to produce and broadcast educational programs. They are, however, designed to supplement not just the classroom but the school itself. They are produced for listeners of all ages, and present education in the context of normal experience, thereby relating knowledge to behavior. This philosophy is now seen in many programs.

The educational offerings of NBC have been equally famous. Probably the best known of the NBC programs is the "Music Appreciation Hour" broadcast from 1928 to 1942 under the direction of Dr. Walter Damrosch. It was discontinued when Dr. Damrosch retired. The more recent NBC Inter-American University of the Air carried three important series: "Music of the New World," "Lands of the Free," and "American Story" stressing music, history, and literature.

Programs of statewide broadcasts are equally well known to the teachers of the respective states. State broadcasting is usually conducted by the state university or the state department of education, or the two in co-operation, which are naturally close to the teachers and school systems of the state. Through manuals and materials printed and distributed in connection with the broadcasts and through newspapers and state journals, the teachers have abundant opportunities to learn about the programs.

Four states—Ohio, Wisconsin, Minnesota, and Texas—have well organized and integrated educational broadcasts. The Ohio State University station, WOSU, rounded out twenty-five years on the air on March 23, 1945. During this time it broadcast programs of music, drama, news, farm information, science, and other topics. It is currently on the air seventy-two hours each week, and its two main activities are the "Ohio School of the Air," program for classroom use in the state; and "Radio College," program devoted to languages, social sciences, music, and other subjects for adults. WOSU is unique in that it has never sold time for advertising purposes.

Obviously, space does not permit the presentation of program samples from all the statewide stations, but the programs of Texas will serve as an example. The Texas School of the Air is organized under the direction of the state superintendent of education and programs are carried by seven state stations. Co-operating with the state department in the preparation of programs are the University of Texas, the North Texas State Teachers College, the Texas State College for Women, the Agricultural and Mechanical College, the State Teachers Association, the Association

for Childhood Education, and the Junior Leagues of Texas. A typical series from October to April was:

DAY	HOUR	TITLE OF SERIES	PLACEMENT
Monday	11:15 A.M.	Your Story Parade	Preschool and primary
Tuesday	11:15 A.M.	Open Your Eyes	Elementary—fourth grade up
Wednesday	11:15 A.M.	Reading Is Adventurous	Junior and senior high
Thursday	11:15 A.M.	Jobs Ahead	High school and adult
Friday	11:15 A.M.	Music Is Yours	Upper elementary and junior high

The twenty-eight weekly broadcasts in the "Music Is Yours" series were:

WHAT MAKES MUSIC
(October–January)

Speaking of Strings
Gone with the Wood-Wind
The Boy Blue of the Orchestra
Rhythm Is Their Business
Keys That Please
All Together Now!
They're Never Too Old
Or Too Young
Nod to the Ladies
Nod to the Gentlemen
Music Goes to Church
Sing We All Noel
Boy Meets Girl
Take Your Choice

WHAT MUSIC MAKES
(January–April)

On with the Dance
La Fiesta
A Nation of Motion
Rambles into Rhythm
Thanks for the Buggy Ride
Music's Funny Bone
Music Down the Years
Music of Make-Believe
Songs of Land and Sky
Music to Match Your Mood
Music of the Range
Music the Year 'Round
Get the Picture
On Your Own

No teacher should have any difficulty in finding out what local broadcasts will be beneficial for his classes. All local papers carry the complete programs. Furthermore, local stations are co-operative and will be glad to assist teachers who desire additional information about broadcast schedules. School broadcasts originating in local stations are well advertised. Often the stations have printed or mimeographed guides for distribution. In some cases the board of education prepares guides for the teachers.

The Cleveland Program. Cleveland Public Schools have made the greatest use of radio for direct curricular content and teacher method-

ology of any school system in the United States. Cleveland operates its own station, WBOE, and this station is on the air each school day from 8:00 A.M. to 4:00 P.M. Programs are designed for every grade level, for teachers, parents, and the general public. Programs are prepared by teachers and supervisors at "curriculum centers" or in a laboratory school. Manuals or guides are furnished teachers, and in some instances the broadcasts are specifically correlated with sets of lantern slides which the listening classes have at their disposal. The Cleveland program is extremely ambitious and truly unique. It enriches and supplements the regular course of study, it provides direct instruction, and it supervises through its demonstration lessons.

Since Cleveland is atypical of local school broadcasting, it is necessary to turn to one of the other thirty-odd school systems using radio in order to show more representative utilization. Pittsburgh will be used as the example, because although it is a newcomer to the field, its programs have been worked out with exceeding care; providing for joint participation of several groups of teachers and various school systems in the county surrounding Pittsburgh. The caliber of the programs is outstanding.

The Pittsburgh Program. Prior to September, 1945, the Pittsburgh Schools relied on the CBS American School of the Air for their radio material. The school year 1945–1946 inaugurated a full program of school broadcasting at 9:45 each morning. Programs were presented over the Westinghouse Radio Station, KDKA. A survey of equipment in September, 1945, showed the following for Pittsburgh only:

RADIO SETS	ELEMENTARY SCHOOLS	HIGH SCHOOLS
Number of school-owned sets available	94	26
Number of teacher-owned sets available	47	44
Number of sets on loan to schools	57	39
Total	198	109

The program for the 1949–1950 spring semester was:

DAY	TITLE OF SERIES	PLACEMENT
Monday	World Partners	Intermediate Grades
Tuesday	Lest We Forget	Upper Elementary and High School

Wednesday	Living with Music	Upper Elementary and Junior High School
Thursday	Adventures in Research	Junior and Senior High School
Friday	Builders of America	Upper Elementary and Junior High School

There were twenty broadcasts in each series—the semester running from the first of February to June 21. The twenty broadcasts for the "Builders of America" series is typical of the entire group.

Pennsylvania, The Keystone State
Early Travel in Pennsylvania
Pioneer Life in Pennsylvania
Where History Was Made
Pittsburgh and Its Rivers
Streets of Pittsburgh Tell a Story
Father Pitt Has His Face Lifted
The Men Who Developed Our Industries
A Hundred Years of Public Education
Western Pennsylvania, The Melting Pot
Good Friday—Special Musical Program
Wealth for the Common Welfare
Pittsburgh, A City of Bridges
Our Products Supply the World
Looking to the Future
Let's Promote Progress
The American Government, Legislative
The American Government, Administrative
The American Government, Judicial
Americans as World Leaders

A Teacher's Handbook was worked out for each series. A special script committee of teachers and studio personnel prepared script and special program guides for each broadcast. The program guide for the broadcast "Western Pennsylvania, The Melting Pot," is a typical one. It is:

A. AIM OF THE PROGRAM

To help us understand our neighbors better
To appreciate the contributions of many races and people to the development of our nation

B. MATERIAL COVERED

Nationalities represented and their contribution to our national development—German, Irish, Italian, Polish, Russian, Scottish, etc.

C. SUGGESTED ACTIVITIES

1. Before the broadcast
   Take a census of the class as to national backgrounds represented. Record results on the blackboard

Briefly touch on contributions of each race to the culture of Western Pennsylvania

2. During the broadcast

   Watch for entrance of individual characters and try to determine the nationality of each by accent

   Note contributions of each

   German—music

   Irish—millwork

   Pennsylvania Dutch—farms

   Greek—restaurants

   Polish—dances

3. After the broadcast

   Discuss student reactions to the broadcast

   Stress the fact that each one of us is linked with some other country, yet all work together for the good of the community and nation

   Encourage students to visit the nationality rooms in the Cathedral of Learning

D. BIBLIOGRAPHY

(Selected list)

Periodic checks were made of the utilization of the KDKA School of the Air programs. For the month of November a check revealed the following:

	ELEMENTARY SCHOOLS			HIGH SCHOOLS		
Day of Week	Teachers	Number of Classes	Pupils	Teachers	Number of Classes	Pupils
Monday	115	142	5,112	19	23	644
Tuesday	49	58	2,088	52	49	1,372
Wednesday	129	154	5,544	40	39	1,092
Thursday	47	49	1,764	56	149	4,172
Friday	125	144	5,184	39	41	1,148
Total	465	547	19,692	206	301	8,428

During November, these programs were heard by 848 classes and 28,120 teachers and pupils. These figures are for Pittsburgh public schools only. No data are available for the Parochial Schools and the public schools of the county. The Pittsburgh Superintendent of Schools reported in his *Newsletter* of June, 1946, the following totals for April, 1946. These data include the program, "Safety Story Lady," a program developed jointly with the National Safety Council and "Let's Tell a Story," produced with the help of the Carnegie Library of Pitts-

burgh, both over station WCAE; and the "Junior Town Meeting of the Air" presented over station WWSW. The April tabulations were:

PROGRAM	STATION	NUMBER OF PUPIL LISTENERS
Art, A Design for Living	KDKA	6,497
Guidance	KDKA	11,711
Music and Literature	KDKA	6,777
There Is Fun Afield	KDKA	5,664
Builders of America	KDKA	5,873
Safety Story Lady	WCAE	6,598
Let's Tell a Story	WCAE	8,545
Junior Town Meeting of the Air	WWSW	2,297
Total		53,962

The radio program just described presented many auxiliary educational activities. There was joint planning which involved the radio stations, schools, and related organizations. The study necessary for planning the programs and writing the scripts should not be overlooked. A workshop for teachers interested in radio writing and production was organized for thirteen weeks in the studios of KDKA. Pupils did the art work for the covers of the teacher's handbooks. Interest on the part of teachers and pupils was marked. Additional equipment has been added. The broadcasts have been continued without interruption since they were started in 1945. Changes have been made in the series each year. The program for the spring semester of 1949–1950 was: Monday—"World Partners," Tuesday—"Lest We Forget," Wednesday—"Living with Music," Thursday—"Adventures in Research," and Friday—"What Do You Think?"

Selection of Program. It has been said that radio utilization in the classroom begins when the program is selected, "for the selection itself is, or should be, made in response to a need." In order to select a program, the teacher must know what is available, and it has already been pointed out that information concerning programs is abundant. The program cannot be preaudited as a film can be previewed, but title, network, station, talent, and possibly a teacher's guide or other printed material will give some idea of the content and likely quality of the broadcast.

The alert teacher who plans to use radio judiciously in his classroom will begin his selection of programs before the school term starts. A

tentative outline of programs will be of great value. The outline might take the following form:

DAY OF WEEK

Time	Station	Maturity Level	Program Title	Purpose of Program
....	......	....	....	....
....	......	....	....	....

This long range chart will need to be revised in the light of additional programs to be broadcast, work of the class, need for supplementary material, and the like. Certainly, any log of this type will need revision frequently. Teacher radio committees or the director of audio-visual aids (if there is one for the school) will be of extreme value in program selection, insuring a more careful coverage of program offerings, nature of the programs, pupil maturity level, and providing suggestions for utilization.

There are numerous criteria which the teacher may apply to broadcasts to insure better selection. The following will be helpful:

1. *Purpose.* There must be a definite purpose in listening. The teacher must know exactly what he wishes the program to accomplish.

2. *Appropriateness.* The broadcast must be appropriate to the maturity of the students. Little more than a waste of time results from having elementary children listen to high-school programs. There are, however, many programs which serve a large range of maturity levels. Some teachers insist on subject appropriateness, but a more liberal philosophy holds that broadcasts need not parallel the school subject in order to make a worth-while contribution to the education of the pupils. In fact, there is much logic to support the contention that the broadcast program should extend well beyond subject bounds. Any program which fits pupils' interests, problems, and needs is appropriate.

3. *Time.* Broadcasts must occur at a time of day when the class will be able to listen without necessitating major administrative changes in class schedules.

4. *Length of Program.* This is another time factor and is important. The length of the broadcast should be such as to allow time for a related discussion both before and after the broadcast. Most school broadcasts are fifteen minutes; a few are thirty. If a class has to disband immediately after the program much of the value of the broadcast is lost. Long pro-

grams may not hold the interest of the pupils, especially of the younger ones.

5. *Presentation.* The teacher has a right to expect a high quality of performance. Pupils should be encouraged to comment on and evaluate the performance. A poorly presented broadcast cannot accomplish maximum results no matter how important the content. Good speech and diction on the part of announcers and performers help to make a satisfactory program.

6. *Interest.* The broadcast should hold the interest of the class. Two things are important: (1) the performers and the script writers need a quality of magnetism and a flair for the dramatic, and (2) the content ought to be within the background experiences, interests, and the maturity level of the pupils.

7. *Authenticity.* Radio programs should meet the tests of accuracy and authenticity applied to motion pictures, textbooks, maps, references, and other curriculum materials. It is not difficult to judge fairly accurately in advance as to whether the program will be biased or objective. Who is sponsoring the broadcast—commercial concern, educational institution, or other agency? What is the reputation of this sponsor? Finally, have the students evaluate the accuracy and authenticity of the statements made. This may lead to debates and discussions, or a search for additional evidence.

Attention has been repeatedly called to the procedure of allowing students to help select and evaluate programs. This is a most legitimate and proper technique. Student advice will materially assist the teacher in finding the best and most appropriate programs. Furthermore, the students have the greatest stake in the program, because it is their education that is being wrought.

CLASSROOM PROCEDURES

"Utilization activities" of a broadcast fall into three phases; namely, preparation, reception, and follow-up. Each will be discussed in brief detail, but radio timing and place and conditions of reception should be mentioned before actually discussing specific techniques and procedures of utilization.

Radio Timing. Radio broadcasts are timed to the split second. Program directors and engineers direct their broadcasts with a stop watch. Every

program must start and stop promptly, and the only exceptions allowed are broadcasts of importance, such as a presidential address or a world-wide event. Aside from these occasions, time is inflexible and invariable. If adjustments and modifications need to be made, they must be made by tailoring the script, or varying the tempo of delivery. It is, therefore, absolutely necessary that school clocks be correct to the second, otherwise teachers will be tuning in after broadcasts have started or too far in advance. Of the two possibilities, the latter is not so harmful as the former, because with the volume turned down, the class can continue its work right up to the opening of the broadcast.

Place and Conditions of Reception. Programs should be heard in the regular classrooms rather than auditoriums. This is an obvious generalization and is as true for radio programs as motion pictures. The classroom is the logical place for the teacher and students to pursue their instructional activities. The atmosphere is conducive to learning; the supplementary materials are at hand.

Classroom Conditions. Classrooms should be free from distracting noises from halls, adjacent rooms, or from the outside. They must be well ventilated.

Equipment and Facilities. Equipment will be discussed in detail later in this chapter, but at this time it should be pointed out that reception must be good if optimum benefits are to be derived from the broadcast. Receiving sets should be kept in good working order.

Correct Tuning. Needless to say, tuning should be perfect. An improperly tuned radio is like a motion-picture projector out of focus. The volume should be adjusted for the class as a whole and not for the teacher solely.

Placement of Receiver. The receiver should be in the most advantageous place in the classroom, usually in the front of the room. It may be attached to the wall in permanent position, or if it is a portable set it is wheeled to the front and center of the room or placed on the teacher's desk or a table.

Disturbances. Minimize disturbances during the reception. A sign on the door will request people not to enter the room. The school office should be notified so that telephone calls will not interrupt. Pupils should not sharpen pencils, adjust radiators, open or close windows. These things should be cared for before the broadcast begins.

Specific Preparatory Activities. Preparation for the broadcast is most important. The amount of preparation depends upon numerous factors, such as, purpose of the program, type of program, age of pupils and other conditions. A music appreciation lesson will require less specific preparation than one on labor problems or the cost of living, but the preparation must be sufficient to make the broadcast meaningful. This can be left to the judgment of the teacher, as such matters of assignments, library work, and other activities are left to his judgment. It should be pointed out that good pedagogy demands that pupils be aware of the aims and objectives of their work. Pupils should be given an important part in the planning of their radio work. Individual pupils may be assigned specific things to check in the broadcast.

Some teachers make the mistake of overpreparing. This results in a diminution of pupil interest because the work becomes a boresome chore. There are definite psychological factors to be considered, and these factors enter into all phases of classroom instruction.

Needless to say, the teacher should have any manuals, teachers' handbooks, or other printed material which may be published concerning the specific programs.

Plan correlated activities in advance. Some of these activities will be engaged in by the class prior to the broadcast and some will be used in the follow-up. Trips, for example, may be more valuable before the broadcast than afterwards.

The above preparatory activities hold for all types of programs: school, nonschool, and out-of-school. Adaptations will be called for depending upon the type of program. These activities will guide out-of-school listening so that pupils critically utilize the programs to which they listen.

The Reception. With preparatory utilization activities properly handled, and with the receiving set properly tuned, the class is ready to listen to the broadcast. The part of the teacher during the reception is important. Usually the teacher remains seated near the front of the room and listens with the class. Under no circumstances should the teacher feel that he can let the class listen while he does something else such as making out reports or entering grades on report cards.

The listening should be informal but not passive. Active listening calls for mental imagery, association, evaluation, criticism, and summarization.

Some teachers require the pupils to take notes during the broadcast,

and even include note-taking and dictation exercises as a part of the preparatory activities. Aside from appreciation lessons, note-taking may be in order, yet it is formalized and overworked in many instances. Pupils should be encouraged to take about the same kind of notes that the teacher will take—informal ones consisting of words or phrases to be discussed later, points stressed in the broadcast, or questions which call for further elucidation.

If a teacher's handbook is available, it may contain suggestions for certain things to be done during the broadcast by pupils or teacher. Without a manual, the teacher does what he considers appropriate to get the most out of the program. He may write an occasional new word on the board, demonstrate a suggested rhythm, or point out an area on a map. Care must be taken that these activities do not distract from the broadcast.

Demonstration lessons such as those presented over the school-owned station of Cleveland often make provision for a limited amount of activity in the classroom during the broadcast. Language lessons may actually direct the class to speak words in unison, or certain notes may be sounded on trumpet or violin. The majority of broadcasts do not have this feature.

The Follow-up. The follow-up is a truly important part of the radio lesson. Teachers' manuals suggest to the teacher further activities, yet these activities must not become routinized and formalized. They should vary according to the nature and needs of the class. Efficient teachers will be at no loss to know what to do to capitalize on the educational values of the broadcast. Assimilation, appraisal, and similar reactions are the ones which will count. The purpose in listening to the broadcast is the real cue. Discussions, debates, forums, outlines, further reading, consulting maps, making trips, interviewing people, taking tests, are all possible follow-up activities. Yet, there are some programs, let us say with strong emotional appeal, which will be best treated if no follow-up is planned.

An essential criterion in the follow-up is integration with other course material and other teaching devices. Exposure to a program does not justify itself—there must be a "leading on." The Ohio State Evaluation study listed forty-one specific follow-up activities.[6] Some of these activities are of great value and have wide applicability, but others are limited. To this list might well be appended the suggestion that if radio is to

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[6]Levenson, William B., *Teaching Through Radio*, pp. 174–76, Farrar and Rinehart, Inc., New York, 1945.

be considered a functional part of the course, along with the textbook the content of broadcasts should be included in reviews and tests.

One point which must not be overlooked in evaluating radio broadcasts, is to see that they stimulate an interest in other radio programs, particularly out-of-school programs. Children who become accustomed to good radio broadcasts at school ordinarily select their home listening with more discrimination.

A very interesting general listing of good radio practices has been formulated by H. B. McCarty, Director of the Wisconsin School of the Air. McCarty has labeled the list *"The Basic Seven" Suggestions for Effective Radio Use:*

1. Check your radio receiver for quality performance. Have the tubes tested twice a year; put up an outside aerial, and tighten all connections.
2. Place the radio in front of the class, at such a height that all children can see the source of sound.
3. Get a teacher manual for each course you plan to use.
4. Prepare your class for each listening experience. See the manual for suggestions.
5. Tune your radio and adjust the volume *before* the broadcast begins.
6. Listen actively! Your attitude is reflected by the children.
7. Follow the broadcast with appropriate activity to make the radio lesson meaningful.[7]

Limitations, Obstacles, and General Considerations. Along with all other new teaching aids and methods, radio has its critics and its enthusiasts. Some educators are slow to accept anything new in the way of instructional changes; others hasten to get on the bandwagon, even with ill-advised and uncritical acceptance. What, then, are some of the limitations, obstacles, and general considerations which need careful scrutiny if radio is to fill its place as a classroom instructional medium?

Critics of the use of radio for educational purposes are quick to say that radio is expensive, that it calls for equipment and for technically trained people to maintain the equipment. Such a criticism must be weighed carefully against the educational advantages to be gained.

Another and more serious criticism is concerned with the claim that radio utilization wastes valuable learning time. It is true that an unplanned use of radio can waste time, but properly trained teachers do not

[7]McCarty, H. B., *Radio Programs for Classroom Use,* Wisconsin School of the Air, Bulletin of the University of Wisconsin, Madison, September, 1948.

fall into this error. Some critics fear that radio and other modern instructional tools will make teaching so easy that teachers will not earn their salaries. Probably the converse is true. It has already been pointed out that the proper utilization of radio demands organization and instructional know-how of a high order. Merely listening to broadcasts is not learning to any great degree. Preparation and planned follow-up activities must go hand in hand with listening. This will be discussed in detail later in this chapter.

Is the radio psychologically unsound as a teaching medium? Does it simply augment a school procedure which is already saturated with verbalism? Is it authoritarian? Does it lend itself to blind acceptance of ideas? Can individual differences be handled? How can provision be made for spontaneity of student questioning? None of these questions is difficult to answer. The answers lie chiefly not in the medium of instruction but in teacher education. *Proper* utilization of the radio can overcome each question.

Problems of inflexibility in both school and broadcast schedules are difficult considerations. But, schools are definitely becoming more flexible each day. Teachers are no longer shackled to a given textbook, a set routine, or a narrowly conceived curriculum. Changes in time for radio listening are possible in most schools. Broadcasting stations have much less flexibility in their schedules, and herein is a factor which certainly limits the usefulness of radio. But even so, schools do find it possible to work within the time-schedule of the broadcasting stations. Also, radio stations are willing to give schools more consideration in planning schedules as the schools make greater use of the programs.

A most recent criticism is to the effect that television will replace radio. This may be, but, if such a condition occurs, which is doubtful, it will happen in the far-distant future. Television is much talked of but it is young and untried. Even if television becomes a significant educational aid, it should not be deduced that radio will be obsolete. To wait fifteen years to see what will become of radio is simply to deprive just that many school classes of the enrichment which radio can bring. Television will be fully discussed in a subsequent chapter.

These and a host of other bugaboos have been raised, but vision, courage, and research have found ways to overcome them. Radio has so many opportunities that the obstacles and limitations are dwarfed in comparison.

STUDENT BROADCASTING

In everything that has been said about radio up to this point, the student has been a listener or a planner for listening, or a "follow-upper." Radio also offers him a whole series of worth-while learning activities as a producer, performer, and technician. Many schools, elementary and secondary, are regularly using student broadcasting of one or more of the following types: intraclassroom and interclassroom, intraschool and interschool, and broadcasting through the facilities of a local broadcasting station. In the latter instance the school makes use of the facilities of the local broadcasting company, and the program goes "on the air." In the former instances, the school furnishes its own equipment and facilities and is not "on the air" strictly speaking. The program is carried only so far as the reaches of the school radio program-distribution center extend.

Student broadcasting is a form of student activity which contains many advantages for the school system recognizing education in a broad sense. Though it may contribute little to formal education, its contribution to a more progressive and functional type of education is great.

The high school of Goldsboro, North Carolina, has a complete radio studio, including workshop, recording booths, control rooms. This view shows sound effect tables, control room (at right), and facilities for cutting in an auditorium stage.

ACME



Function of Student Broadcasting. The function of student broadcasting and the values contained therein are:

1. Thrill, interest, and motivation come from working with the magic medium of radio. Probably every person, young and old, has a yen to broadcast or to take part in broadcasting.

2. Opportunities are provided for creative work. Students take an active part in writing scripts, planning programs, acting, and in the complete production of programs. There is great pride in taking part in a broadcast.

3. Students with special aptitudes and abilities will find these activities an outlet for their talents. A student who has written a play, skit, or theme of merit can be rewarded by having the composition read over the microphone, or adapted for the microphone. Students who speak well will be cast in parts for the broadcasts. Special ability in planning and organizing will be utilized. Mechanically-minded students can exercise their abilities in real situations, and a host of other abilities can be used in like manner.

4. The stimulus to better speech is great. The radio extends the opportunities offered by the classroom or auditorium stage. Listening students take note of the speech and diction of their classmates and regard it more professionally than they do in classroom exercises.

5. Student broadcasting offers opportunities for the development of initiative and responsibility.

6. Students learn by doing. Student broadcasting requires careful preparation. A simple example may be taken from student newscasting. If the student has the responsibility of preparing and giving a newscast, he has a keen motivation in reading and learning about news happenings, in finding interesting events, in checking veracity, and in presenting his "news notes" to his classmates.

7. Students learn to work together. The broadcast involves a great many people in a number of ways—the technician and the artist, the writer and the planner, the publicity director, and the consumer.

8. Student broadcasts lead to a keener appreciation of other radio broadcasts, of radio as a form of art, and of higher radio standards. Students become much more conscious of the attributes of good programs.

9. Students can contribute in larger measure to the entertainment and recreation of the other students in the school, especially in music, drama, and storytelling.

10. Students learn the value of radio as a means of bettering school-



These students have worked hard for this school broadcast. They know how to read their parts, move toward and away from the microphone, turn script pages, and share responsibility for the project.

COURTESY OF PITTSBURGH PUBLIC SCHOOLS

community relationships. Whenever students broadcast from a local station, parents and friends are certain to listen. They take pride in their children's accomplishments and their good will is reflected back to the school. Even the in-school student broadcasts give the parents reason for pride in their school program.

11. These activities may be in the nature of prevocational training. This function should not be overestimated, but it has at least a minor value.

12. Student programs unify the school body and help integrate the curricular and extracurricular programs of the school.

13. Student broadcasting can supplement the larger radio program which the school utilizes from networks, state, regional, or local sources.

The Detroit Public Schools recognize four main functions of radio programs in the school. One is "to provide selected pupils with learning experiences in broadcasting radio programs." This, says Dr. Paul T. Rankin, was "largely unrecognized in the beginning [of the Detroit program]."[8]

Equipment Needed for Student Broadcasting. Student broadcasting and the equipment for it fall into three categories. The first and simplest

[8]Rankin, Paul T., "Education by Radio in the Detroit Schools," in Irvin Stewart's *Local Broadcasts to Schools*, pp. 14–15, University of Chicago Press, Chicago, 1939.

type is one of "make-believe" and uses no equipment at all other than an eraser or some other object held in the hand to represent a microphone. This type is quite generally limited to use with very young children. The second type is the one which is emphasized in this chapter, and involves a public address system or a central radio program-distribution system. The third type involves no equipment since it relies on the use of the facilities of the local broadcasting station, unless, of course, programs are "piped" direct from the school to the local broadcasting station. Although equipment will be discussed in detail elsewhere, it seems appropriate to call attention to this aspect of the equipment at this time.

Separate radio receiving sets in each classroom are too expensive, since they can be used for outside program listening only. Therefore, today both in the furnishing of new buildings and in modernization of old ones, a central program-distributing system with loudspeakers for each classroom is becoming accepted practice. Two- or three-channel installations are favored over the single channel, because this latter limits the equipment to but one use at a time. Additional equipment such as input mixers, large-size dual-speed turntables for transcriptions and recordings, two or more microphones, instantaneous recording units, acoustically treated rooms, and other facilities and devices, is finding its way into modern schools.

A central program-distributing system, usually referred to as a central sound system or a radio-sound system, is a composite sound system including facilities for radio reception, a transcription and record player, microphone, amplifier, and loudspeakers—probably one in every classroom, shop, gymnasium, auditorium, and custodian's quarters. The central sound system, then, can care for radio broadcasts coming in from outside radio stations, or programs originating in the building. These programs can be relayed only to those places in which loudspeakers have been installed. If two school buildings are near each other, both may be wired to a single central sound system.

Many schools have made the mistake of installing the central sound system in the principal's office or a small cubicle adjacent. This placement is unsatisfactory because auditions, rehearsals, and broadcasts will interfere with the functioning of the principal's office, or the presence of the principal will curtail the enthusiasm of the radio cast. The telephone in the principal's office is sure to ring in the midst of a broadcast. Usually, too, either the office or the adjacent room is too small to allow a large

group to broadcast—a group such as a glee club, band, or large drama cast. Newer schools are, therefore, setting aside a special studio of one or two rooms for broadcasting. This is arranged with the control room separated by a glass partition, and treated acoustically so that good broadcasting conditions are assured.

How to Organize for Student Broadcasting. Whether for listening or production, the students of classes using the radio should be given a major share of the responsibility for making the project a success. Each teacher will have his own ideas about organizing his class. This may be done by committee or individual assignments.

After discussion and decision to prepare a broadcast, the preparation of the script is a major assignment. This exercise calls for nice co-ordination with a number of the departments of the schools; the departments will depend upon the nature of the program.

The script, when completed, will be turned over to the teacher in charge, or possibly a teacher-pupil committee. If the school is a large one and has a special radio director or teacher, it may go to him for criticism and suggestions. Those who read the script will test it against such criteria or questions, as:

1. Is the script the right length for the time allowed for this program?
2. Does the class (or school) have the talent to perform the parts involved?
3. Does the script violate any school policies?
4. Is music necessary, if so can it be furnished either in "live" or recorded form?
5. Does the script call for impossible sound effects?
6. Do the lines read well? Are the sentences too long and involved? Is the vocabulary suitable?
7. Is the script interesting? Does it have dramatic effects?
8. Is the content of the script significant?

When the script has been approved, casting is next in order. Auditions may be held if the production is of major importance, or parts may be assigned so as to allow all pupils to participate for the sake of the experience.

Rehearsals follow casting. Rehearsals can be held in the regular classroom, but sooner or later, the rehearsals should be held in the studio with

These students on a special-talent program are poised because they have "know-how."

COURTESY OF ATLANTIC CITY PUBLIC SCHOOLS



microphones. Members of the cast must read their lines well, cues must be taken promptly, and sound effects blended for a successful broadcast.

Finally, the program is broadcast. If possible, a recording should be made of the broadcast, not for a record alone, but as a means of improving future broadcasts, because it may be played over and over and analyzed.

Additional planning is involved if the program is to be broadcast over the local radio broadcasting facilities. Transportation to and from the studios, rehearsals at the studio, planning with broadcasting officials, and split-second timing are needed.

Many schools have carefully controlled means of checking on the effectiveness of their broadcasts. Questionnaires bearing on specific broadcasts will enable the school authorities to know pretty definitely just how the students feel about the programs. Questions involving items such as the following will be helpful:

1. Did you learn anything from the broadcast?
2. Did the broadcast relate to any classwork you are doing?
3. Was it interesting?
4. Do you want to discuss it with others?
5. Did it raise any points about which you should like further information?
6. Did you consider any parts of the broadcast as untrue or exaggerated?
7. Have you listened to similar broadcasts at home?
8. Would you like to have other similar programs presented?

Program Suitability for Student Broadcasting. A wide variety of material is suitable for programs for student broadcasting over the school's public address system. Schools having well-organized programs of school broadcasting have found students ingenious and original in preparing programs, but the standard types of broadcasts include such as the following:

1. *Announcements.* The public address system makes it possible to provide for daily broadcasting of announcements. Not only does such an arrangement provide a valuable experience for the students who participate, but it actually saves the time of teachers and administrators. Announcements are made regularly at an appointed time each day. Students listen more carefully than if teachers read school bulletins in their classes. Broadcasts of this type should be well done so that listener interest is maintained. Scripts should be used. They should be clear, coherent, and well organized.

2. *Newscasts.* News ranks high in type of radio programs listened to by the American adult population. It has wide appeal to school children. The school newscast may be simple or comprehensive. It may deal exclusively with school and local happenings, or it may branch out and include state, national, and world events. Students placed in charge of such a program may be selected by student vote or by the faculty, or the responsibility may be delegated to a club or a group such as the staff of the school paper.

3. *Musical Programs.* Musical programs are easy to produce. Recitals involve only one or two individuals and rehearsals are no problem. No



Sixth-graders broadcast folk songs of Italy on "Operation Classroom," a series planned for in-school use.

COURTESY OF STATION WCAU, *Philadelphia Bulletin*

script is needed other than for opening and closing the program and announcing selections. Glee club, orchestra, and band concerts present more problems because of the number of people involved, but rehearsals can be held outside the studio, and if there are sufficient microphones to pick up the performance adequately, no great amount of trouble will be experienced.

4. *Drama.* Good dramatic performances always rank high in listener preference lists. For school broadcast purposes, scripts may be prepared in drama or English classes, or suitable scripts may be borrowed from Radio Workshops and Exchanges. The United States Office of Education has available for loan to schools more than a thousand scripts covering a variety of subjects and topics. During the war years, these scripts were very popular, since a number of them dealt with defense, bond and stamp campaigns, and salvage efforts. Dramatic broadcasts require good scripts and acting talent. These programs correlate closely with oral and written English.

5. *Talks or Reports.* Both formal and informal talks may be presented by students, but always from prepared scripts. There is opportunity for a wide variety of talks or subjects. They include special reports prepared as a part of the regular classroom work in any subject, reports on trips, hobbies, experiences, sports, books, and many other topics.

6. *Interviews.* A student or faculty leader can present an interesting interview of winners of contests, new teachers, new students, visiting personages, college representatives, local officials, or interesting personalities. It takes a good leader to make such a program a success. Ordinarily persons appearing on a program for an interview should have advance notice of the type of questions to be asked, and in general be able to speak freely and easily. Scripts are recommended.

7. *Panels, Round Tables, Forums.* Student panel discussions of current topics make a worth-while and popular program with children of nearly all ages. Rabelais wrote, "It is wise to get knowledge and learning from every source." Panel discussions provide an opportunity for all sides of a question to be presented. Those who take part in such programs naturally should be informed. Scripts may be used, but extemporaneous discussion is more interesting.

8. *Junior Town Meeting or Town Hall Programs.* These are similar to the panels described above except that they are more stereotyped as to participants, fixed speeches, and program content.

9. *Quiz Programs.* Programs of this type are modeled after well-known radio programs. If carefully planned from the standpoint of questions to be asked, they are interesting and valuable.

10. *Variety Programs.* These deal with skits and innovations prepared for assembly use around holidays, special days, or special events. Although scripts must be used, these programs are informal, and students enjoy them. A good leader (master of ceremonies) is an essential.

Radio Workshops. The school Radio Workshop has become popular. The workshop consists of a group of teachers and students concerned with the study of radio as a medium of communication. Workshops deal with radio comprehensively—with studying, planning, writing, experimenting, and training in the use and understanding of every phase of the medium. Groups read and write scripts, produce programs, listen to and evaluate programs, experiment with sound effects, and encourage a more efficient community utilization of the radio. The workshop is considered the best means to the study of radio which the school has developed. It is informal, friendly, and based on the interest and ability of its members. Some schools allow students credit for participation in the workshop; others consider it more of an extracurricular activity.

In organizing a workshop, the following procedures are suggested:

1. Name a workshop director, who may be assigned the title of school radio director. This person should have some background with radio techniques, as well as an interest in the subject. For him to have had a university radio-workshop course is desirable.

2. Provide the director with assistants—students and teachers. Committees will be needed. These committees will vary from school to school, but some of the needed ones will be planning, script writing, music, drama, technical problems, production, evaluation, recordings, and library.

3. Obtain equipment so that programs can actually be produced, recordings made, and sound effects prepared.

4. Keep the entire school informed about the workshop. Produce. It is a mistake to spend too much time on reading scripts, listening to programs, discussing values, and analyzing trends, although these are important.

Students should be allowed freedom for exercising imagination, originality, and special talents. Workshops offer opportunities in one form



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Students take part in a junior town meeting program.

or another for every student. They are not activities reserved just for students who can write, act, or speak distinctly.

Programs in Chicago, broadcast for in-school listening over the Board of Education's Frequency Modulation Station WBEZ, are signed off with "This has been a production of the Central Radio Workshop, an activity of the Radio Council of the Chicago Public Schools." Workshop students from the various high schools meet one evening a week with the staff members to analyze scripts, hear talks from local station directors and engineers, write scripts, and prepare programs for broadcasting. Other schools carry on similar activities during the school day.

It should be pointed out that the radio workshop has also been tried out by many groups and organizations other than the schools. College and university workshops for teachers, and for those planning to enter radio as a profession, are numerous. Some of the commercial broadcasting companies have sponsored others. Summer camps, settlement houses, churches, local radio councils, and governmental agencies have organized workshops.

The workshop atmosphere lends a tone of realism to the work which is not found in the ordinary classroom. Artificiality in radio seems to be more devastating than in other types of training.

RADIO COUNCILS

Local, state, and regional Radio Councils have been formed in various places throughout the country. These councils are composed of representatives of educational, religious, civic, and social groups. The idea for forming such councils grew out of the planning of the National Committee on Education by Radio in 1935.

The scope of the councils was originally conceived as that of a "co-operative, program-planning, program-producing" body concerned chiefly with marshalling the educational forces of a given region. One of the most successful of the regional councils is the Rocky Mountain which has twenty-nine members in Wyoming and Colorado. These members represent colleges, universities, public schools, women's organizations, farm, medical, and educational associations. Eighteen radio stations in the two states co-operate. A Director of the Council has stated its objectives as:

1. To develop a practical program service through more effective public service broadcasts in the region
2. To develop programs of regional interpretation
3. To help the council members—especially the colleges and universities—extend their extramural services to the people of the region
4. To demonstrate for educators and for the radio industry alike that *educational materials lend themselves to radio* as a medium of communication
5. To set high standards for educational broadcasting in the region, and *to encourage the development of useful regional programs* by both educational and commercial interests
6. To help radio stations in the performance of their public service functions *for the people in their respective listening areas.*[9]

Local radio councils are to be found in many cities. Ordinarily the work of such a local council is likely to be confined to stimulating council groups toward better radio consumption, creating incentives for high standards in programs, keeping the community informed about the programs and services of educational, civic, and social-welfare organizations, and co-operating with the schools in the production and utilization

[9]Hudson, Robert B., *Summary Report of the Rocky Mountain Radio Council, August 1, 1942 to July 31, 1943*, p. 5.

of radio programs. Some councils are dominated entirely by the schools.

The local school radio department may be the nucleus of a radio council, in which case it is only natural that much of the work of the council would be directed toward the school. Among its activities are sponsoring workshops, conferences, and clinics, the publication of radio scripts and program-listening guides, acting as liaison between the community organizations and the broadcasting stations, holding contests for script writing or radio utilization, and in numerous ways promoting a better community use of the radio as a medium of communication.

TEACHER TRAINING

If teachers are to be expected to use radio and recordings as an important classroom technique, it goes without saying that they should be given instruction in this technique. This is just as important as requiring teachers to have had training in the use and administration of standardized tests, the motion picture, the socialized recitation, reading techniques, and other teaching methods. The use of the radio by teachers cannot be left solely to the initiative of the individual teacher. Bungling and ill-advised uses can be eliminated if teachers are properly educated.

The professional training of teachers begins when they enter a teacher education institution, and continues after graduation as long as they remain in the profession. Opportunities for both pre-service and in-service training are needed. Most of the colleges and universities offering teacher training, now provide courses in radio for teachers. Summer courses are numerous. The programs for teacher training should be so complete that every teacher will know the value of radio, its educational and social influence, acquire facility in the use of equipment, and learn how to prepare and produce programs. Perfunctory understanding is not sufficient, if radio is to bring fresh, dynamic, and significant experiences into the classrooms.

In-service teacher training supplements the pre-service training and provides opportunities for learning about radio utilization for those teachers who did not receive pre-service instruction. Many large city school systems have organized in-service radio courses, demonstrations, clinics, workshops, conferences, and supervisory aids for the teachers. A few of the larger commercial broadcasting companies have arranged courses and workshops for teachers.

Current developments in the use of ultrahigh-frequency broadcasting make it more imperative than ever that teachers understand radio. Educational institutions are stepping up their radio utilization with this new type of broadcasting. Hundreds of schools which have heretofore made no use of the radio will most likely become regular consumers of frequency modulation broadcasts. The development of this type of broadcasting and its educational possibilities will be discussed in a subsequent chapter. In commenting upon the implications of FM for the classroom teacher, John W. Studebaker, formerly United States Commissioner, said:

> For the classroom teacher, what will this anticipated trend toward educational broadcasting over school-owned FM stations mean? More work, perhaps, or less work? Probably neither. Obviously, in providing the classroom teacher with a more efficient, high-precision tool with which to work, it will call ultimately for a higher degree of professional skill, if its maximum potential effectiveness is to be attained. Whatever additional work and study may be involved in acquiring the techniques necessary to the effective use of radio in the classroom, however, we can be sure, will result *inevitably* in a progressive elevation of the classroom teacher's professional status.[10]

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Using the reasons advanced by the principals of some Ohio schools for not using radio, page 419, prepare an answer to each, showing how the objection may be overcome.
2. Make a study of several radio teacher's manuals. What constitutes a desirable manual?
3. To what extent and under what conditions should secondary schools allow academic credits for participation in a radio workshop?
4. School credits are often given for the outside reading of books when done systematically. (a) Should the same be true for home radio listening plus examination? Should this be applied to in-service teachers who need additional academic credits for permanent certificates, or other upgrading?
5. What are the psychological factors upon which radio in education is based?
6. Prepare an outline for the evaluation of the results of classroom use of radio.
7. Report on scientific studies which have compared learning by radio with learning by conventional methods.

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[10] Abstract from an address by John W. Studebaker, delivered at the Third Annual Conference on Radio in Education of the Northeastern Radio Council, Schenectady, N. Y., May 26, 1945, *Education for Victory*, 3: 14, June 20, 1945.

8. Make a list of specific things which you believe you should know in order to use radio effectively in your own classroom. Can these things be taught in a radio utilization course for teachers?
9. Make a log of the broadcasts suitable for school use in your area for one month.
10. Evaluate each of the following forms of audio aids for education (if a complete answer to this question is impossible at this time, hold it in abeyance until the following two chapters have been studied):
    (a) Using general public radio broadcasts which are not especially designed for school use
    (b) Using broadcasts designed especially for schools by commercial stations—local or network
    (c) Using broadcasts of educational stations such as the "School of the Air" programs in Ohio, Wisconsin, Minnesota, and Texas
    (d) Using broadcasts over ultrahigh-frequency educational broadcasting systems operated by school-owned stations such as those of Cleveland, Chicago, New York, Detroit, Newark, Atlanta, St. Louis, and San Francisco
    (e) Using programs originating within the local school system which are broadcast by means of a public address system
    (f) Using sound recordings either by means of a phonograph or a central sound system

LABORATORY EXERCISES

1. Listen to a selected number of educational broadcasts. Report on values and possible uses of these programs.
2. Prepare a radio demonstration lesson with a group of pupils. Programs can be selected so that this is possible. Hold a critique following the demonstration.
3. There are several good sound motion pictures which explain certain technical aspects of radio. Screen one or two of these films and discuss. Here are some suggested titles:
    (a) *Air Waves*—11 minutes, produced by RCA. A tour of the NBC Studios; developing sound effects; broadcasts from early stages to completion.
    (b) *On the Air*—28 minutes, produced by Westinghouse. Shows history of radio; animations describe how sound is transmitted and received.
    (c) *Electrons on Parade*—20 minutes, produced by RCA. Shows the functions of the radio tube and explains its applications to radio, phonograph, telephone, television, and similar equipment.
    (d) *Behind Your Radio Dial*—25 minutes, produced by NBC. This film documents the people, organization, and operations which make NBC's radio and television programs possible. Produced as a public relations film.

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Chapter 17

THE RADIO—FREQUENCY MODULATION

Important new developments are taking place in radio science every day. Research has been going on at an accelerated pace. Wartime needs added impetus to this research. Among the new developments are three very important ones which will unquestionably bear heavily on future educational improvements—high-frequency broadcasting, facsimile transmission, and television. This chapter deals with the first of these three electronic developments.

THE DEVELOPMENT OF FREQUENCY MODULATION

Standard radio makes use of only a limited segment of the radio spectrum—that portion which lies between 550 and 1600 kilocycles. Beyond this range lie almost limitless fields of radio waves which become shorter and shorter until they finally become light waves. Research is gradually

opening up the possibilities of using these high-frequency waves. Alert to new scientific developments which will aid education, schoolmen are interested in the possibilities of these high-frequency waves. One writer speaks of these radio waves as a part of our "public domain," air, not land. But first, what are these high-frequency waves, how do they differ from the longer waves which amplitude radio uses, and what are the developments which are taking shape?

Frequency Modulation Explained. Since radio waves are characterized by their *amplitude, frequency,* and *phase,* they can be distorted or modulated by changes in any one of the three. Thus, the radio engineer speaks of amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM).

Simply explained, radio is a system of wireless communication by which sound waves created in a studio are changed into electrical waves by the broadcasting transmitter, radiated into space, and then picked up by a receiving set which transforms the electrical waves back into sound —the same sound produced in the studio, except that certain distortions may have happened to it along the way. Electrical waves have the same form as sound waves, but since they can travel only a short distance, it is necessary to use some vehicle to carry the electrical sound waves over wider areas. This vehicle is called the "carrier" wave. Carrier waves are measured by the frequency of vibrations per second. Thus, a radio beam of 900 kilocycles is a carrier wave with a frequency vibration of 900,000 per second. For convenience this vibration is nearly always referred to in terms of kilocycles. Standard radio broadcasts on carrier waves of 550 to 1600 kilocycles. The measurement may also be in terms of megacycles. This will be more meaningful, if one keeps in mind that 1,000 cycles make one kilocycle and 1,000 kilocycles are equivalent to one megacycle. Therefore, conventional broadcasting bands range from 550 to 1600 kilocycles or approximately 0.5 to 1.5 megacycles. Stations which operate in the neighborhood of six megacycles are said to be using high-frequency wave lengths, and operations at 25 megacycles are termed ultrahigh-frequency. Frequency modulation, facsimile, and television broadcasts are in the ultrahigh-frequency area. The channels from 42 to 50 megacycles have been designated as the FM band.

Frequency modulation is not a new form of communication, as some people believe, but rather a new arrangement of the transmitted signal.

The two principal characteristics of a radio wave are amplitude and frequency. In standard broadcasting, amplitude modulation (AM), the frequency vibrations are kept constant, and the amplitude or power of the fixed wave frequency fluctuates. In frequency modulation (FM) the reverse is true, that is, the power remains constant, but the fluctuations created in the microphone in the studio vary the frequency of the wave. Thus, in the case of AM the carrier wave vibrates at a frequency assigned by the Federal Communications Commission and never varies from this frequency, but the sound waves going into the microphone vary considerably in shape and pattern. Middle C on the piano vibrates 256 times per second. Harmony or quality is given by a series of *overtones* which vibrate at rates of 2, 3, 4, 5 or more times 256 up to 8,100 vibrations per second, the limit of the sound range of the piano. If overtones were eliminated, a given note as sounded on a piano, banjo, violin, or whistle, would sound the same, and one could not distinguish between the instruments.

Sounds ranging from 16 to 16,000 vibrations per second can be detected by the human ear. Therefore, the conventional radio with its unvarying frequency cannot transmit all the tones and overtones which one can hear; in fact it carries less than half the vibrations which it is possible to hear. Furthermore, this restriction reduces fidelity and realism in the broadcast sound. With FM the reverse holds. Frequencies vary by 200 kilocycles, or a plus and minus variation of 100 kilocycles from a given frequency length. This provides FM with an air roadway sufficiently wide to broadcast the full range of sound frequencies without creating any problem of station interference. Obviously, standard broadcasting, ranging from 550 to 1600 kilocycles, cannot accommodate the existing 900 stations with varying frequencies. Consequently, when frequencies are varied, it is necessary to operate in a different area of the spectrum.

Origin and Growth. The existence of the ultrahigh-frequency wave lengths has been known for a long time. Research has been trying to find a way of using them. Major Edwin H. Armstrong, Professor of Electrical Engineering at Columbia University, has done much of the pioneering.

Technical developments had advanced so far by 1938 that the FCC was ready to assign the ultrahigh short-wave frequencies for general utilization. Educators and commercial interests were quick to see the opportunities in this new development. The United States Commissioner of Education asked schools, colleges and universities, and other educa-

tional interests throughout the country for an expression of interest in frequency modulation. The response was enthusiastic. Educators saw in this new "public domain" a chance to regain a stake in radio which they had let slip away from them in the twenties and thirties when amplitude radio was developing. As a result of the hearings held by the FCC in 1938, 1939, and 1940, the "Forty Megacycle Band" was allocated for FM. Educational institutions were tentatively granted exclusive use of five channels from 42 to 43 megacycles. This educational area was adjacent to the area set aside for commercial FM development. This proximity to the commercial assignments is considered an advantage owing to the fact that receiving sets can carry both broadcasts with a slight change of the dial. Subsequent developments have resulted in some shifting of assignments so that currently twenty FM channels have been assigned to education and thirty-five to commercial interests. Education's area is now located from 88 to 92 megacycles.

In the developmental period during the war, it looked as though educational institutions were not going to take full advantage of their golden opportunities in high-frequency broadcasting. James L. Fly, then Chairman of the Federal Communications Commission, needled them into action by his blunt statement that "If education doesn't want and doesn't need those channels, and if it doesn't prove its desires and needs by actu-

After hearing "Preview of Tomorrow" over FM radio, these seventh-grade science students proceed with elementary chemistry and physics experiments.

WIDE WORLD



ally making intensive use of them, history is going to repeat itself, and education will again find that it is left with memories of a lost opportunity." Mr. Fly's point was that the FCC had no intention of reserving certain choice FM channels for the exclusive use of education if educational interests didn't get busy and use these channels. Commercial interests were ready to take over these channels if education was not ready to exploit them. Spurred by this statement of Mr. Fly's and by the aggressive leadership of the Commissioner of Education and the Federal Radio Education Committee, educational interests set about actively to utilize their twenty channels.

Dr. John W. Studebaker has made a clear statement of what is developing:

> FM in education has arrived. The twenty cleared channels provided by the Federal Communications Commission are fast being taken up. It began with great city systems like Cleveland, New York, Chicago, and San Francisco and universities like the University of Illinois and the University of Kentucky, in addition to which we found a long list of licenses granted this spring to both individual school systems and to universities and colleges, ready to get into operation. Joining the vanguard are city systems like Kansas City, Buffalo, Newark, Detroit, Sacramento, El Paso, and universities like Columbia, University of Iowa, University of Southern California, Michigan, Louisiana State, University of Oklahoma, the Oklahoma Agricultural College at Stillwater and many others in all parts of this great country of ours. Radio was for years brought to the schools. Turn about is fair play. We are now bringing the schools to radio and the record is a good one to date.[1]

Educational Stations in Use or with Applications Pending. The most outstanding use of radio in education is to be found in Cleveland. Not only has Cleveland been a leader in amplitude modulation, but it is now a leader in frequency modulation. In 1925 the Cleveland Public Schools started their broadcasts over station WTAM. After thirteen years of experience with standard broadcasts, the Board of Education switched to FM in the fall of 1938, utilizing its own station, WBOE, and broadcasting in the ultrahigh-frequency band of 41,500 kilocycles. Five other educational institutions, along with Cleveland, formed the FM educational vanguard.

On May 1, 1948, the Radio Division of the United States Office of

[1] "FM Educational Frequency Allocation Now Extended Over Nation-Wide Area," *Service Bulletin of the FREC*, p. 1, October, 1946.

Education published a list of educational radio broadcast stations. This list of seventy-nine stations in twenty-nine states is too long to reproduce, but a breakdown of the stations into types is worth while and appears as follows:

Higher Educational Institutions AM........31	—	Stations Functioning FM........17
Higher Educational Institutions AM........ 2	—	Stations under Construction FM........13
City School or County School Systems AM........ 1	—	Stations Functioning FM........ 8
City School or County School Systems AM........ 0	—	Stations under Construction FM........ 7

Forty-five educational FM stations in twenty-nine states add up to a resurgence of interest in radio on the part of schools, colleges, universities, and other educational institutions. But the story is not complete, because the Federal Radio Education Committee states that dozens of applications for stations have been filed or are awaiting engineering surveys prior to being filed.

In 1945 the Executive Secretary of the American Association of School Administrators submitted a questionnaire to the school superintendents in cities with populations of twenty thousand or more, asking them if they planned to install FM radio stations. Replies were received from 276 superintendents. The results were:

40 per cent either have stations or are definitely planning installations
6 per cent plan to have them eventually
17 per cent plan to share in state-wide networks

According to this expression of plans, about two out of every three schools in the larger cities have plans for installing or utilizing FM radio.[2]

PLANNED COVERAGE

It has been estimated that 65 per cent of the nation's area and 80 per cent of its population will eventually be covered by educational FM

[2]Shankland, S. D., "Interest of City School Systems in FM Channels for Education," pp. 188–89 in *Official Report:* The American Association of School Administrators, April, 1945.

systems. For this accomplishment, three types of coverage are necessary: *local, regional,* and *state-wide.*

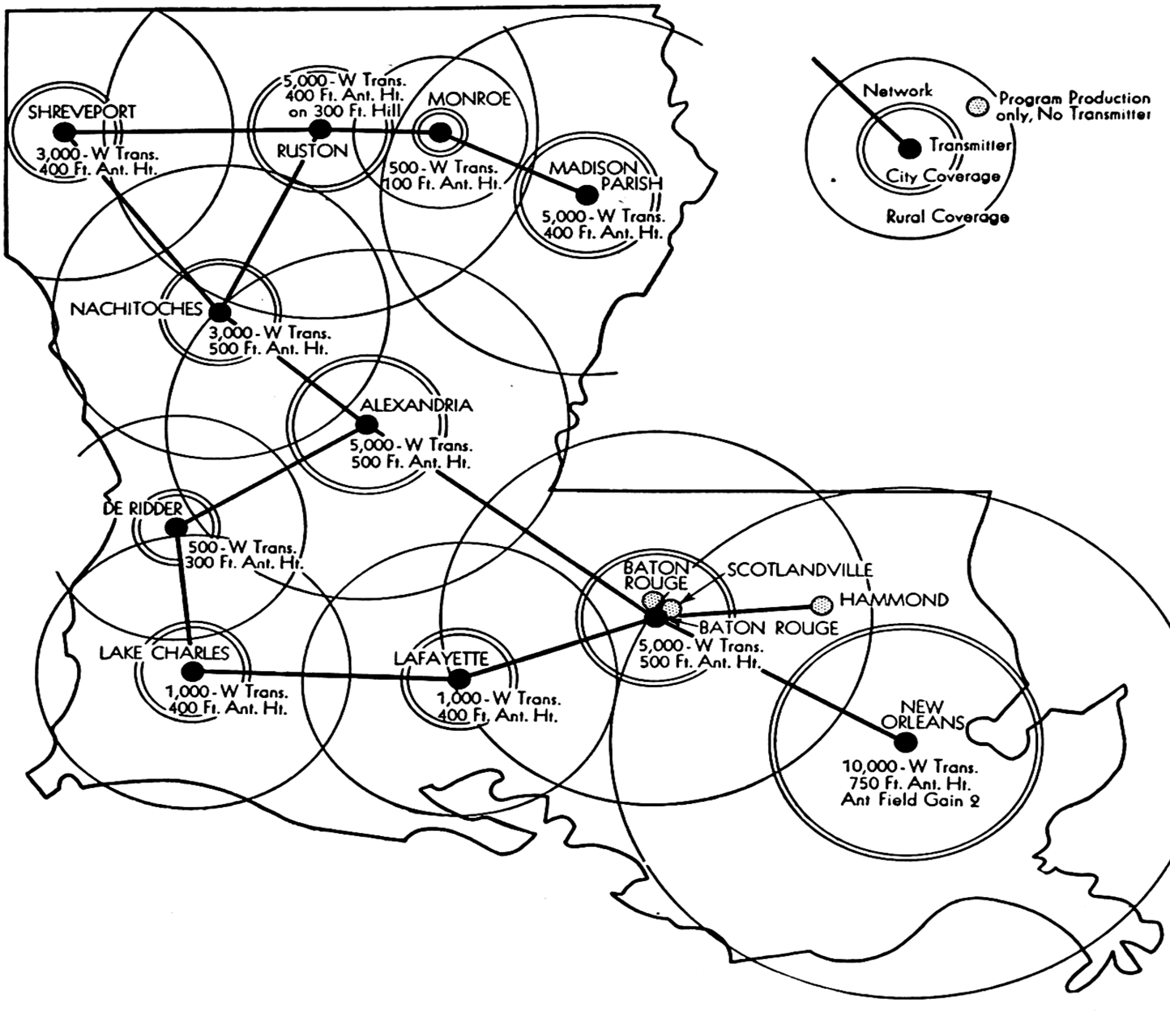
Local FM Broadcasting. Some local schools are large and homogeneous enough to be expected to assume the responsibility of ownership and programming of stations. Programs for these stations will be produced locally and consumed in the same area. These areas will be able to use low-wattage and relatively inexpensive stations, and will have sufficient program facilities to occupy the major portion of the broadcast day. This type of facility already exists in Cleveland, Detroit, Newark, Chicago, Atlanta, St. Louis, New York, and San Francisco.

Regional FM Broadcasting. In other places several districts may conveniently pool their resources and efforts and operate a station jointly. Such a region may be a county or some other land-area pattern. It must be kept in mind that FM's range is limited to the distance of the horizon visible from the top of the transmitting antenna, therefore, topography becomes an important consideration. In general, FM broadcasting is limited to a distance of thirty to fifty miles. This range approximately coincides with county areas or the combined area of four or five adjacent small city school districts. At least two county school systems are now constructing FM stations. They are Los Angeles County in California and Lane County in Oregon.

State FM Broadcasting. State-wide broadcasting is necessary if all areas of a state are to be assured coverage. Rural districts and small towns must not be left out. It is estimated that the present radio system, extensive as it is, still leaves close to one-third of the American people without primary service. Such coverage will ensure a greater exchange of ideas on state problems—social, political, economic, and educational.

In the second place a state-wide intercommunication system will help small local stations to develop. At present it is almost impossible for small stations to provide continuous programs for eight hours a day, but if they could affiliate with a state system and have access to certain programs, the life of the station would be assured. Furthermore, more diversified programs would be possible because of the greater range of talent which could be called upon.

A state system would enable colleges, universities, and state departments of education to reach all the people. Extension services of the



WLSU and Proposed FM Educational Network for Louisiana

With 11 properly spaced transmitters, Louisiana can bring the benefits of educational radio service to every school and home. This chart, prepared by the U. S. Office of Education, recommends that transmitters be located at centers where programs can be originated; large city school systems, the State University, teachers' colleges, private institutions, and the State Department of Education. Black connecting lines show network facilities designed to assure state-wide program coverage when desired. WLSU is already in operation at the State University, Baton Rouge, and is supplying programs over a hundred-mile radius even with a temporary antenna. From *FM for Education*, p. 21, 1948.

educational institutions could reach more people, and state departments would be in closer touch with the schools and teachers. This would mean better supervision and a greater understanding of the educational problems of the state.

In order to show how a state-wide FM network can provide radio facilities for every district in a state, an illustration is inserted at this point. The chart on page 467 shows the comprehensive coverage of Louisiana. Similar charts have already been prepared for twelve states involving a total of 122 separate FM stations. At least fourteen other states are considering similar moves. Wisconsin has FM stations at Madison, Chilton, Delafield, and Wausau. Stations at Eau Claire and La Crosse will go on the air in 1950. The legislature will be asked to make appropriations in 1951 for two more stations to complete an eight-station web for the state.

Any state which plans a state-wide network needs to exercise care, because there are numerous pitfalls. Finances must be available. Utilization must be assured. High standards of performance should be drawn. Only equipment which is on a par with that used by commercial organizations should be installed. Program priorities and time allotments need careful study so that the schools are assured a real place in the programming.

EVALUATING FM'S WORTH

Advantages of FM. The advantages of FM over AM are many and real for education. It might also be added that commercial organizations are as interested in FM as educational organizations. Numerous commercial stations are already functioning; and a flood of applications, now before the FCC, indicates more will begin broadcasting in the near future. It is reported that radio manufacturers predict that twenty million American homes will have FM receiving sets during the next four years. Some radio engineers have gone so far as to predict that AM will become practically obsolete in a relatively short span of years. The reasons for this unusual interest in FM are to be found in the advantages claimed for it.

FM is relatively cheap both as to station installation and maintenance. One authority estimates the installation costs to range from $15,500 to $62,000, and annual maintenance and operation to range from $13,000

to $24,850.[3] The United States Office of Education has estimated costs to be lower than those given by Derning.

FM is less subject to static and interference than conventional radio; in fact it virtually eliminates the disturbances in reception from natural and man-made static. It is often referred to as "staticless radio." FM is extremely successful in screening out nature-made static, such as that produced by lightning, sun spots, and atmospheric conditions. Static, man- or nature-made, has been described as miniature broadcasting stations out of control, since static is actually a matter of waves similar to those broadcast by the conventional radio. The only way to reduce static with AM radio is to increase the power of the broadcasting station so that it will deliver a signal to the receiving set which is twenty to fifty times greater than the static signal. When two signals are received on an FM receiver, the set receives the stronger and "blocks out" the weaker, thus eliminating station interference, provided one signal is twice as strong as the other.

Greater fidelity and the full range of sound frequencies can be transmitted by FM. This is explained by the fact that wider roadways are provided in the upper spectrum for FM. Each FM station has been assigned a channel 200 kilocycles wide or twenty times wider than a conventional one. Interference is eliminated since only 75 per cent of a channel is used for the program, and the remainder acts as a safety zone. FM is actually able to deliver to the receiving sets almost exactly what goes into the microphone.

Now that it is within budget range for many schools to own their own broadcasting stations, they will automatically have control over types of programs, broadcast hours, and policies. This control they have never had in the case of AM. It has, for the most part, been a case of the school's fitting its listening program and needs to the broadcast station's time, wishes, and whims. With the school owning its own station, the station's programming fits the school's needs. Also, school districts owning stations will find them helpful in meeting emergencies arising from fires, storms, and epidemics. With the home, school, and community in instant and close communication, there is likely to be better understanding of the problems of each other. The school will be enabled to take its rightful place in adult education.

Various stations throughout the country may be assigned to broadcast

[3] Deming, Robert C., "Education Plans Its FM Network in Connecticut," in *Official Report of 1945*, p. 195, American Association of School Administrators, April, 1945.

on the same frequency. Education has been granted twenty channels. These channels can take care of many hundreds of stations. A bit of judicious geographical spacing makes possible the establishment of a great many stations without interference. Incidentally, this has been a grave problem in AM.

The educational FM station will be serving smaller audiences, and can, therefore, provide more specialized programs, or more discriminating programs for specialized interests. AM is interested in huge listening audiences, and accordingly builds its programs of a general nature to appeal to a multitude.

There is no conflict between educational and commercial FM interests. The spectrum can care for both without crowding. Furthermore, in a very real sense the education stations will supplement the commercial. Educational stations will never be able to do what the commercial ones do for the general public, but they can do some things which the commercial cannot do. The educational stations will tend to present more serious programs of general cultural worth, and the commercial, although significant, will in all likelihood follow the AM pattern of elaborate production, national and international news coverage, and the presentation of great events and leaders. The two types of services then become complementary.

Limitations Which Exist in FM. Although many advantages rest on the side of FM radio, there are limitations which will prevent some schools from sharing in this new development, or at least delay utilization. These limitations do not lie in the instrument, but in the inadequacy of schools to exploit it.

1. Costs are relatively low when one considers that the broadcasting equipment costs just about the same as two classrooms. There are, however, maintenance costs which smaller schools will not be able to meet. A very practical solution to this problem lies in the school's co-operating with a state network for reception, and with no attempt being made to originate local programs.

2. Program preparation and the operation of any radio station call for a technique which the staffs of many schools lack. More than 600 colleges and universities are now offering courses in radio, and with the growing importance of FM undoubtedly many teachers will be enrolled for these courses. Trained personnel will be forthcoming.

3. FM has distance limitations. Without the aid of relay stations, a broadcast signal can be heard only in the distance visible from the transmitting antenna to the horizon. FM signals depend upon ground waves instead of skywaves. This accounts for the fact that there is no fading in the FM receiver. The distance limitation can be overcome in a fashion by placing the transmitter on high buildings or natural elevations. This distance limitation will naturally place certain geographic locations at a disadvantage. Viewed from another angle, this limitation is an asset. The distance range is such that a district can reach its outermost limits but not beyond; consequently, the district can prepare a specially planned program solely for, and need have no obligation outside, its own requirements.

HOW SCHOOLS USE FREQUENCY MODULATION

What Schools Are Doing with FM. FM is not a dream which theorists and enthusiasts are urging the schools to accept, "if and when." Already it is functioning in at least eight public schools and seventeen universities. At least three of these institutions have had their stations long enough to make some worth-while and significant evaluations of what is being accomplished. In the city of Cleveland, the experience gained with FM can be compared with that gained with AM. It was in 1938 that the Cleveland schools established their own noncommercial radio station, and after two successful years with AM broadcasting they moved over to an FM wave length. This meant not only new transmitting equipment, but also a complete set of new receivers, because the sets in



New avenues of learning are opening to both the participant and listener through the radio quizonaire program.

COURTESY OF ATLANTA PUBLIC SCHOOLS

operation in the Cleveland schools at that time were not constructed to receive both types of broadcasts. But Cleveland found the funds, and new receivers were placed in the schools. After the shift to FM had been made and the program was well established, a survey of reception quality was made. Levenson, then Supervisor of WBOE, Cleveland School Radio Station, reports:

> WBOE has had an unusual opportunity to compare the relative merits of AM and FM broadcasting since it has tried both and since the location of the schools is such that an excellent check of reception in varying conditions could be made.
>
> . . . a survey of reception quality was made among the schools, every one of which had purchased FM receivers. The response was unanimous in indicating that FM broadcasting was superior. Today we feel that school reception is no longer the "bottleneck" of classroom radio.[4]

The experience of the Chicago public schools has also been significant. Chicago started school radio programs in a more or less haphazard manner many years ago. In 1937, the Chicago schools organized a Radio Council and radio was developed in earnest. The basic philosophy of the Radio Council of the Chicago Schools was: (1) radio in the classroom must be a pleasurable listening experience, (2) it must supplement the work of the students and teachers in the classrooms, (3) under the guidance of the teachers, radio should motivate the students to further activities, and (4) an evaluation of programs and procedures must accompany the production of programs. With the addition of a school-owned and operated FM station, WBEZ, in 1943, there was added to the already existing philosophy the concept that radio is a service department charged with the responsibility of co-operating with all departments and all schools for the best interests of education.

In reporting on the merits of FM, George Jennings, Director of Station WBEZ, makes this estimate:

> Reception on FM receivers is considerably better than over standard sets. Man-made and natural static is not transmitted through the FM receivers. With fixed-tuning sets (which will eventually be used in every school) there will be no interference, no fishing for the broadcast station at the last minute before program time. A click of the switch will bring in WBEZ.[5]

[4]Quoted by Boutwell, William D., *FM for Education*, p. 3, U. S. Office of Education, 1944.

[5]*Ibid.*, p. 3.

Further corroborative experience comes from James F. Macandrew, Radio Director for the New York Schools. The statement of Macandrew is significant in the light of the welter of broadcasting in New York City.

> One of New York City's best known high schools is so located that its principal reported that radio programs were a complete waste of time. Man-made static was so bad that not even the 50 kw. network stations could be heard with any degree of satisfaction. As a test and with a temporary installation, an FM receiver brought in all the 1 kw. FM stations in the area with perfect clarity. In further substantiation of the above, it may be said that WNYE gives clearer reception in schools with FM facilities than its AM counterpart of equal power to which its programs are piped.[6]

A third report on what the schools are doing with their FM stations comes from San Francisco—George B. Mullany reporting:

> During the school year KALW operates Monday through Friday from 10 A.M. to 3 P.M. as an additional instruction aid to classroom teaching in the San Francisco Public Schools. The character of the programs has been threefold:
>
> 1. Enriching classroom instruction through complementary radio programs
> 2. Supplementing administrative operations of the school department
> 3. Acquainting the adult audience outside schools with modern trends in education
>
> Through its daily programs Station KALW has made the majority of San Francisco public-school teachers conscious of the possibilities of this medium as an additional instructional aid, although all observers agree this phase of the program is in its experimental stage.[7]

Specific Utilization Techniques. Utilization techniques for FM in the schools will vary little from the utilization of AM already discussed in a previous chapter. The tool or medium is the same, and the differences which occur in utilization will be those which are possible owing to the fact that a school-owned station has almost complete control of its programs and general activities. Radio programs will be closely integrated with school schedules, and will be timed to the convenience of the potential listener. Assembly programs, for example, will be broadcast at the regularly scheduled assembly hour. Teacher and student participation

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[6] *Ibid.*, p. 3.

[7] Quoted by Dunham, Franklin, *FM for Education*, Revised, pp. 3–4, U. S. Office of Education, 1948.

in the preparation and production of radio programs will be enlarged. Under the current AM arrangements, a great deal of the educational broadcasting involves no teacher-pupil participation except listening and classroom follow-up. With a local school station, teachers and pupils will find additional opportunities for participation.

Unquestionably "the voice of education will be magnified." Radio programs can and will be prepared for a semester in advance. This planning will be done by the Radio Council or some comparable committee on which the Director of Curriculum Studies will have an important place. Teachers of all grade levels and subject areas will be represented.

Effective utilization is the biggest problem in educational radio. To prevent waste of school time and to circumvent the charge of putting on radio "shows" or entertainment programs, school officials will have to make their radio programs real assets to the educational program of the district, and show the teachers how to employ the best available techniques in constructive utilization. This is no small task, and is certainly not one to be handled by laissez-faire methods.

The Cleveland Public Schools have achieved outstanding success in radio utilization. Six general procedures have evolved from their experimentation and study of school radio utilization. They are:

1. A demonstration studio is maintained as a part of the radio station. To this studio, teachers may come to witness a "classroom demonstration" by an expert teacher.
2. Often before a program series is begun, a special introductory broadcast is planned for the teachers and is broadcast after school hours. This "dress rehearsal" of the series is presented and explained by a supervisor, the script writer, an assistant superintendent, or other persons who are connected with the series. This discussion includes the purposes of the program, its form, time, and the major ways of utilizing the program.
3. Teachers' guides are prepared for the more comprehensive programs. These guides suggest detailed uses of the program, follow-up, references, and correlations with such other media as stereographs, lantern slides, maps, motion pictures, and other sensory aids.
4. "Laboratory schools" or "curriculum centers" are set up for the development of teaching procedures and programs for broadcasting. (See explanation of these "centers" on following pages.)
5. Teachers are encouraged to take courses in school radio utilization offered in nearby colleges.
6. The final approach is not so much a technique as it is a guiding philoso-

phy. The Cleveland school system *believes* in educational radio. This concept has become a fundamental part of the school's approach to educational problems. Radio is inextricably integrated with the school program, and is never considered as a novelty or a side issue.

In the near future, another technical development, facsimile broadcasting, will assist schools in their utilization of sound broadcasting. This technique will provide another avenue of communication from the broadcaster to the listener. Facsimile is a type of wireless printing or visual reproduction which can be broadcast simultaneously with the sound program over the same FM channels. More details of this development will be given in the following chapter.

Classroom utilization of programs will vary more or less in accordance with the school's philosophy of education. At present there are two rather distinct positions held by educators regarding classroom utilization of radio. The first point of view holds that radio is a supplementary aid to classroom work. Its purpose is to supplement the work of the regular teacher by bringing inspirational and richer content to the class through the use of experts and other persons whose opportunities to know and experience certain things are greater than those of the typical teacher. Many of these experts will be teachers whose abilities and experiences have enabled them to go beyond the attainments of most teachers. Many a child who is now bored by music, geography, health study, history, science, or some other cultural experience may find inspiration and pleasure in the topic when the instruction is supplemented by a series of planned radio programs, involving master teachers, experts, student groups, interviews, community leaders, and various resource people.

The second point of view holds that radio is a medium of teaching in itself. This position is not entirely distinct from the first because there is definite overlapping. This second point of view is rather well exemplified by the program in the Cleveland Public Schools. Although many of the Cleveland broadcasts are distinctly supplementary in type, there are a great many which offer direct teaching in the form of "demonstration lessons." Functioning as a service agency, the Cleveland radio maintains a close relationship with the supervisory officers and teaching staffs. Cleveland has organized a dozen schools as "curriculum centers" or laboratory schools. To these centers go those teachers who appear to have the greatest capabilities, widest experience, and most interest in the teaching of certain subject areas. In these centers, experimentation goes

on in developing improved teaching methods. As new techniques, methods, and findings develop, they are broadcast from time to time as "demonstration lessons." These lessons cover about every aspect of the curriculum.

The two points of view on uses of radio may be illustrated in this way. In Chicago, for example, the Radio Council prepares a broadcast for the elementary school children on "Numbers at Work" or "Figures are Fun." Such a program will be an interesting and entertaining presentation of the value of arithmetic, or how to get enjoyment out of it. In Cleveland there may be a few programs of this type, but there will also be a series in "4B Arithmetic." If subtraction is the specific subject of the lesson, the pupils engage in a regular lesson except that instead of being directed at this particular period by the regular classroom teacher, they are directed by a radio arithmetic teacher from one of the "curriculum centers." Some critics have asked if such demonstration lessons tend to destroy the pupils' confidence in their regular teacher. Such has not been the case in Cleveland. Nearly all urban schools provide supervisors in music, art, penmanship, health, social studies, or other fields, and these supervisors commonly give demonstrations to specific classes. Having a radio at his disposal simply enables the supervisor to give more demonstrations and to reach more teachers and pupils than he would if he had to travel from building to building to meet with one class at a time. The possibilities of using this supervisory service for small towns and rural areas where supervision is practically nonexistent are intriguing, to say the least. In writing of the Cleveland experiences with radio, Charles H. Lake, then Superintendent of Schools said: "We are convinced that many phases of schoolwork can be improved by a reasonable amount of direct and indirect classroom instruction over the radio. We are convinced that while the radio is not a substitute for the teacher, it is a device which extends to a remarkable degree the work of the good teacher and the influence of the supervisor and administrator."[8]

Nearly everything taught in the school curriculum has radio broadcast possibilities. Joseph E. Maddy of the University of Michigan has shown what can be done in direct radio instruction in music. He has taught boys and girls throughout the country to play musical instruments—actual skills that go beyond just the appreciation of music. The late Elmer

[8]Quoted by Lambert, R. S., "FM and Educational Broadcasting," *The Ontario Public School Argus*, 3: 92, April, 1944.

Stephan in Pittsburgh did the same thing in art. Foreign languages are a "natural." It takes no stretch of the imagination to visualize direct or supplementary teaching in science, social studies, health, literature, journalism, vocations, safety, and other subjects.

Slow learners and pupils with low-grade reading ability profit greatly from radio instruction. In literature, for example, adaptations and dramatizations of current books and standard classics give these children an understanding and appreciation which they seldom get in the regular classroom recitation. They are motivated and encouraged to read. The schools of Toledo, Ohio, report unusual success in this realm of instruction.

The general field for FM educational broadcasting, in addition to classroom and specific broadcasts, is so great that it encompasses nearly every conceivable educational and cultural activity. A few of them are:

News and current events
Storytelling
Interviews of prominent persons
In-service teacher training
Emergency announcements
University extension education
Correspondence work
Public school relations
Programs for the handicapped and shut-ins
Entertainment
Home, school, and traffic safety
Guidance service
Library programs
Adult education
Music for special activities
Student talent programs
Forums
Community services
Sports programs
Holiday programs
Amateur musical groups
Governmental services
Homemaking programs
Vocational review and study

At the College and University Level. Colleges and universities are as vitally interested in the educational possibilities of radio as the public schools. Radio enables the institution of higher learning to serve its community in a broader and much more dynamic fashion than campus service alone. Approximately fifty colleges and universities are already broadcasting regularly on AM stations. An equal number either have or are planning FM stations. With FM their services will be increased, and scores of other institutions will find it practical and feasible to establish stations.

Correlating Radio with Other Instructional Aids and Materials. It is quite obvious that the most effective education takes place when the most appropriate and dynamic aids, devices, and techniques are unified. Radio broadcasts, FM or AM, are naturally linked with such materials and tools as transcriptions, recordings, facsimile, and television. Broadcasts can and must be unified with such visual aids as motion pictures, stereographs, stereopticons, maps, globes, graphs, flat pictures, scrapbooks, bulletin boards, representations, and similar media. School journeys to museums or other places must also be tied in to effect the complete unification.

Wise teachers will not shrink from using FM, recordings, motion pictures, and other technological aids, nor will they throw overboard the educational media which have proved themselves through the years. Radio is not a panacea for illiteracy. It will not supplant teachers, but it can enrich their work. As with the use of other tools, it is perhaps axiomatic that the best teachers make the greatest use of it, while the teachers who need it most, use it least.

When citizens have experienced a good modern school system, they are unwilling to go back to an inferior one. The teacher-textbook dominated school cannot successfully prepare youth for their place in society. To meet the challenges of democratic living, youth must be stimulated to do, plan, verify, solve, and think, but these activities must be about problems which are meaningful to them. Society must place in the hands of well-educated and understanding teachers the scientific tools and materials necessary to live up to these responsibilities.

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Why has the U. S. Office of Education taken more interest in FM than in AM?
2. Estimate the cost of installation and operation of a school-owned FM station for a city of 100,000 population. (Consult Dunham, *FM for Education, op. cit.*)
3. Estimate the additional cost of equipping each classroom with a receiving set which will accommodate both FM and AM reception.
4. What are the likely effects of a school-owned FM station on (a) teachers, (b) pupils, (c) community?
5. Report what steps, if any, your state has taken to provide FM to the schools of the state.
6. What are the likely benefits of a state-co-ordinated FM system to the rural schools?

LABORATORY EXERCISES

1. Each year contests are held to select prize-winning radio scripts written by college and high-school students. The college contest is sponsored by the Association for Education by Radio and the high school by *Scholastic Magazine*. The winning scripts are published and distributed each year by Audio Devices, Inc., 444 Madison Avenue, New York 22 (price of the 1948 edition is $.60). Other scripts may be borrowed from the Radio Division of the U. S. Office of Education. Appendix G reproduces a KDKA School of the Air prize winning script. It combines the voice of the announcer, dialogue among a small cast, and simple sound effects to produce a theme based on the interrelationships of man and his natural environment.
   (a) The class should study an already prepared script and present it.
   (b) The class should write a few simple scripts basing them on themes or topics from the language arts, creative arts, social studies, science, human relations, or current events.
2. Screen and discuss one or more of the following sound motion pictures:
   (a) *The Story of Communications*—22 minutes, produced by Films, Incorporated. This film shows an interesting historical approach to communications. The scope is from the flashed signals of smoke or light and drum beats down to twentieth century television.
   (b) *The Story of FM*—10 minutes, produced by General Electric. A color film which explains some of the mysteries of FM.

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Chapter 18

TELEVISION AND FACSIMILE RECORDING

TELEVISION

Man has long dreamed of an invention that would enable him to transfer from one place to another, instantaneously, actions perceived by the eye and sounds heard by the ear. The motion picture enabled him to transfer actions and sounds, but not immediately—the transfer had to be delayed while the recorded sound and action were processed in a laboratory. The radio enabled him to transmit sound instantly from one place to another without any noticeable delay. Now, electronic science has effected the immediate transmission of sight and sound together.

Television is no longer a dream. It is a reality, yet it is sometimes difficult to convince oneself that it is here. People have become accustomed to thinking of television in terms of future development. Television is not in the "crystal set" stage; it is technically quite advanced and is today broadcasting sound which is as good as conventional radio sound, and pictures which are as good as motion pictures. There will be further

developments, but the basic transmission principles and structure are already in an advanced stage of development.

Television is commonly referred to as "video" to distinguish it from aural radio. Aural radio is basically speech and music. Video is aural radio plus sight and all its ramifications. It has the visible clarity of the motion picture and the immediacy of a stage play, football game, or other event.

The outlook for video challenges the imagination. It is an important milestone in the developing history of audio-visual education. Today it is possible to bring the world to the classroom *on the instant,* and a child twelve years old will actually have seen more of the world than his grandfather saw in a lifetime. Experiences of limitless variety and global extent are now open to great masses of people, whereas, before the arrival of video, these experiences were limited to the fortunate few.

Mechanical Development and Improvement. Contrary to general opinion, television is an old concept which has developed little by little for more than a century. Many scientists and inventors have played major or minor parts in this development. Selenium was discovered in 1817 and in 1873 its light-sensitive properties became known. The cathode ray was demonstrated in 1878 by Sir William Crookes, and five years later Edison added to the general understanding of electric current and burning filaments.

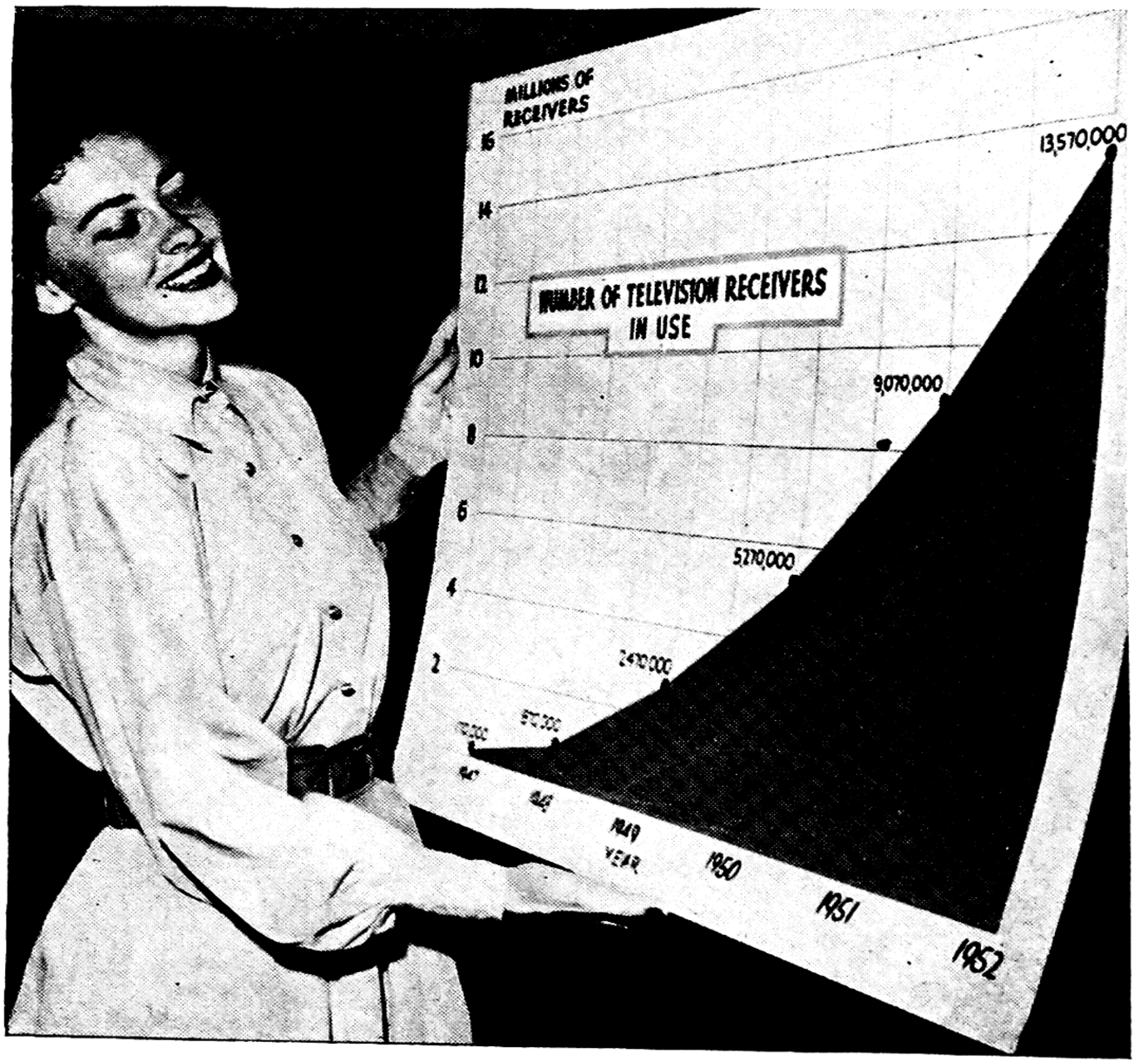
From 1920 to 1930 was a period of technological research. Many outstanding results were accomplished by several men. Supersensitive tubes were developed and the problems of scanning were studied. In the twenties, 30-line to 60-line images gave vague flickering pictures; they were the forerunners of the present high fidelity pictures available in a 525-line system.

In 1928 General Electric's radio station at Schenectady, WGY, began a regular broadcast television schedule three afternoons a week. Three years later RCA began experiments using the Empire State Building in New York City as a transmitter location. These experiments involved both mechanical and electrical transmitters. By 1933 "all-electronic" television was assured, and the 1939 telecasting of the opening of the New York World's Fair is accepted as the launching of modern television.

Great corporations such as RCA, G. E., NBC, CBS, Farnsworth, Zenith, Bell Telephone, motion-picture companies, and others showed concern over this new medium of communication, and started a period

not only of giant research effort but of internecine strife to try to get control of the new industry. The research efforts were most beneficial but the fight for control of the industry handicapped its development in many ways. This strife is still going on, although it has somewhat abated since World War II, through regulations laid down by the FCC.

Many interesting new developments and first steps were taken during the late thirties and in the war years of the forties. Among these developments were outdoor telecasting, use of mobile trucks for "spot" or news television, telecasting full-length dramas, baseball games, presidential inaugurations, church services, and political conventions. Although the war temporarily handicapped the spread of television facilities, in other ways it hastened the development through an unprecedented research in electronics. The immediate postwar period saw nine active television stations on the air—three in New York, one in Schenectady, one in Philadelphia, two in Chicago, and two in Los Angeles. During 1948 the number rose from sixteen to sixty-four. Nearly a hundred stations are now in the process of construction, and the FCC has a backlog of three hundred applications on file. Currently there are 1,500,000 receiving sets in operation, serving an audience of 6,000,000 people. By the end of another year, the estimated number of receiving sets will be 3,000,000.



This graph attempts to predict the growth of television from 1947 to 1952.

COURTESY OF GENERAL ELECTRIC COMPANY

Coast-to-coast networks will be opened in 1953 and the television industry foresees 19,000,000 families with sets. It is further predicted that by 1955 there will be a thousand telecasting stations. The accompanying chart shows the predictions for 1952. Costs for receiving sets have been materially reduced. The FCC has proposed opening up forty-two additional channels to supplement the twelve now in use. Something like five hundred telecasting stations are all that can be accommodated under the present allocation of twelve channels.

Typical television programs can be illustrated by simply taking a day at random for a station. Below are programs from four New York City stations.

WNBT—CHANNEL 4

5:45—Hopalong Cassidy Film
7:00—Mary Kay and Johnny
7:20—Review of the News
7:30—Welcome Aboard—Variety
8:00—Author Meets the Critics: Gerald F. Winfield, Dr. Paul Linebarger, Annalee Jacoby
8:30—Meet the Press—Senator-elect Estes Kefauver of Tennessee
9:00—Television Playhouse: The Old Lady Shows her Medals, with Lucille Watson, Cameron Mitchell
10:00—Television Newsroom
10:10—Basketball—Jamaica Arena

WCBS-TV—CHANNEL 2

12:30—Music; Weather; Film Shorts
1:00—Vanity Fair
6:15—Music; Weather Reports
6:30—Lucky Pup; Children's Show
6:45—Bob Howard, Piano
7:00—Film Shorts
7:30—Television News
7:45—Make Mine Music
8:00—Film, The Kid Sister
9:00—We, The People
9:30—Basketball: St. John's vs. Utah
11:00—Newsreel

WJZ-TV—CHANNEL 7

5:30—Stained Glass Windows
6:00—Cartoon Teletales
6:30—The Singing Lady
7:00—Film Shorts
7:45—Pauline Frederick's Guest Book
8:00—Hollywood Screen Test: Betty Furness
8:30—Actor's Studio: To the Lovely Margaret, with Bambi Lynn, Billy Redfield, others
9:00—Film: Hands Up

WPIX—CHANNEL 11

5:00—Comics on Parade
5:15—Pixie Playtime
5:45—Magic Books
6:00—News: Six-Gun Playhouse
7:00—News: Record Rendezvous
7:30—Newsreel; Films
8:00—Eddie Condon's Floor Show
8:30—Zero Mostel's Show
8:45—Tennis: Eastern Junior Indoor Championships
10:15—Newsreel

How It Operates. The heart of television is the electronic tube, which has the ability to convert light, which is reflected from a scene into a pattern of electrical impulses that can be transmitted through the atmosphere and, before your very eyes, to reconvert the electrical impulses into light, thus reproducing the original scene.

To understand what takes place in television, it is necessary to begin with the camera and the scene to be transmitted. The television camera, like the motion-picture camera, has a lens that picks up the scene, or rather the light reflected from it, and focuses it on a plate. The plate, corresponding to the film in a movie camera, is within an electronic tube, the cathode ray tube. Like photographic film, the plate is sensitive to light. But instead of being coated with an emulsion, it is covered with hundreds of thousands of photosensitive cells, tiny globules of silver. When light strikes one of these cells it gives off a minute electric charge, the amount of the charge varying in proportion to the amount of light hitting the cell. Thus, in effect, an image of the scene has been transferred to the plate, except that the lights and shadows are represented by electric charges of varying intensity. The electronic tube has done its first job of changing light into electrical impulses. The problem now is to lift these charges from the camera plate and transfer them to the receiving set.

Unlike the movie projector, which can cast a whole picture upon the screen, television cannot project a picture as a unit. The impulses must be picked up and transmitted in orderly sequence so that the picture can be put together again in the receiver. This is where the electron, a particle of electricity that is the smallest thing yet discovered in the world, comes into the picture. In the neck of the camera tube is an electron "gun" that shoots a thin beam of electrons at the plate. The electron beam picks off the electric charges on the plate and sends them through the wire to the transmitting station. There they are broadcast on short waves, literally carried to the receiving sets by "carrier" waves.

This sounds like a slow process and one might expect that the picture on the receiver would appear by little bits at a time, like parts of a puzzle, as the electrons come plunking along. Actually it happens quite fast. The camera plate is scanned thirty times a second, which means that thirty complete pictures a second are reproduced by the receiver.

Just as in motion-picture projection, this high-speed repetition gives a flickerless picture with continuity of action. It was noted earlier that sound motion pictures are reproduced on the screen at the rate of 24

frames a second. The television rate is 30 pictures a second because 30 is an even multiple of the power supply frequency of 60 cycles a second.

After reaching the receiver the electrons climb off their "carrier waves" and enter another electronic tube, the funnel-shaped picture tube. The end of this tube is coated with fluorescent material that glows when struck by electrons. The number of electrons striking the end of the tube—which is actually a screen—varies exactly in proportion to the intensity of the electric charges picked up from the camera plate back at the scene. Thus, each point on the end of the tube glows with different intensity, depending on the strength of the electric beam at the instant the particular point is struck. And thus the original scene is reproduced by a point-by-point duplication of its lights and shadows.

"Scanning" is the term given to the process of analyzing and assembling the actual picture. The method is not unlike that used by the human eye in reading. The eye follows each horizontal line of print from left to right, gathering information along the way. It then jumps back to the left side of the page and the process is repeated. Television scanning differs only in that lines are scanned alternately, and the "dots" or picture elements are filled in so rapidly that the picture appears to flash on the receiver. Facsimile broadcasting which will be discussed later in the chapter utilizes the same principle, but the scanning is done at relatively slow speeds.

Size of Pictures. Most people have the idea that television pictures are necessarily quite small, and therefore viewing is a close-range process. Two types of receivers are available—direct-view and projection. The first type utilizes the end of the picture tube as the screen, and employs tubes of 7-inch, 10-inch, 12-inch, 15-inch, and 20-inch diameters. The projection type projects an image on a detached screen. Images of almost any size are possible. Projection receivers are more expensive than direct-view types.

The Educational Potential. As yet the many uses which television will serve are not fully known. The medium is too new to have been explored in more than fragmentary fashion, nor are the actual methods of utilization beyond the experimental stage. The ways in which it has been used not only are interesting in themselves, but give some indication of future uses.

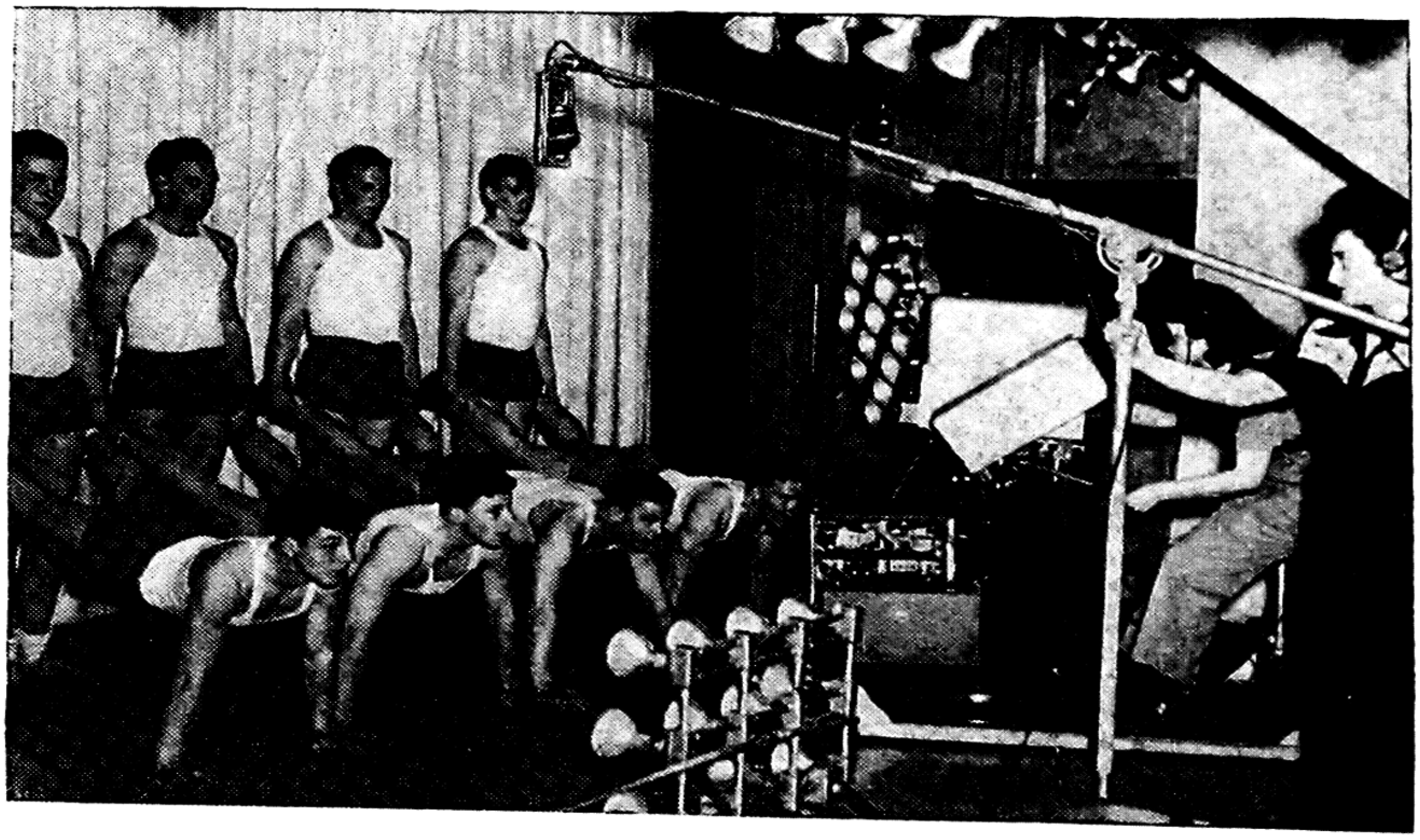
Utilization by Schools. Educators are blueprinting plans for the utilization of this newest tool in the kit of scientific materials for learning. At least half a dozen schools are experimenting with TV, but no one has a program that goes beyond the experimental stage. Most teachers, principals, and administrators who have used video are enthusiastic about its possibilities. Their objectives at present are:

1. To find out as much as possible about this new medium of communication, including programming, educational and social values and some skills
2. To give both teachers and pupils an opportunity to know television firsthand
3. To lay the groundwork for the day when the schools will inaugurate integrated educational programs for instructional purposes

Experimental educational television in the New York public schools has been carried on through the work of a special school committee with James P. Macandrew, radio co-ordinator for the New York public schools, acting as chairman. Three projects have been carried out.

First, the committee working with NBC's WNBT, has sponsored a series of television science broadcasts for ninth-grade pupils. This series, known as *Your World Tomorrow,* has achieved some success. A series of standard tests have been prepared and are administered to the pupils before and after viewing the programs as a check on the benefits derived. Questionnaires to teachers and pupils seek to establish the value of televised programs in comparison with equivalent treatment by motion picture, radio, lantern slides, and other educational methods.

Second, the committee has organized an All-City Television Workshop in co-operation with CBS's station WCBS. This workshop provides op-



A Physical Education Demonstration on TV

COURTESY OF RADIO COUNCIL, CHICAGO PUBLIC SCHOOLS

portunities for a hundred high-school pupils to receive careful video training at the New York Schools' FM station WNYE and then to telecast a series known as *There Ought To Be a Law.*

A third series was inaugurated to provide a television quiz show for junior high schools. A tournament has been arranged in which forty schools entered teams of ten members. The quiz material is drawn from the syllabus of the junior high school program. Each team prepares questions and quizzes other teams. After a team's questions have been used, they are printed and distributed to all the junior high schools in the city. This series alone will enable forty schools and four hundred students to have an active part in educational television.

Philadelphia's Public Schools have also been active with a series of experimental programs. The school year 1947–1948 showed four experimental programs produced by the city school children and telecast by Philadelphia's four TV stations. One program, *Young Philadelphia Presents,* was given over Station WPTZ for sixteen consecutive telecasts. The average number of pupil participants in these programs was seventeen. The series dealt with a wide variety of topics, such as physical fitness, American History, agriculture, art, music, cooking, sewing, drama, Boy Scouts, Junior Red Cross, arithmetic, cartooning, foreign languages, and others.

These talented high-school students are broadcasting selections from light opera on a special TV show.

COURTESY OF STATION WCAU, *Philadelphia Bulletin*



A second Philadelphia series was entitled *Let's Make Music.* It dealt with approaches to the teaching of music from the elementary level to the senior high school. In addition to individual and group teaching of both voice and instruments, the program introduced rhythm activities, song games, and dances. Fifteen programs were given in this series with an average pupil-participation of twenty-five.

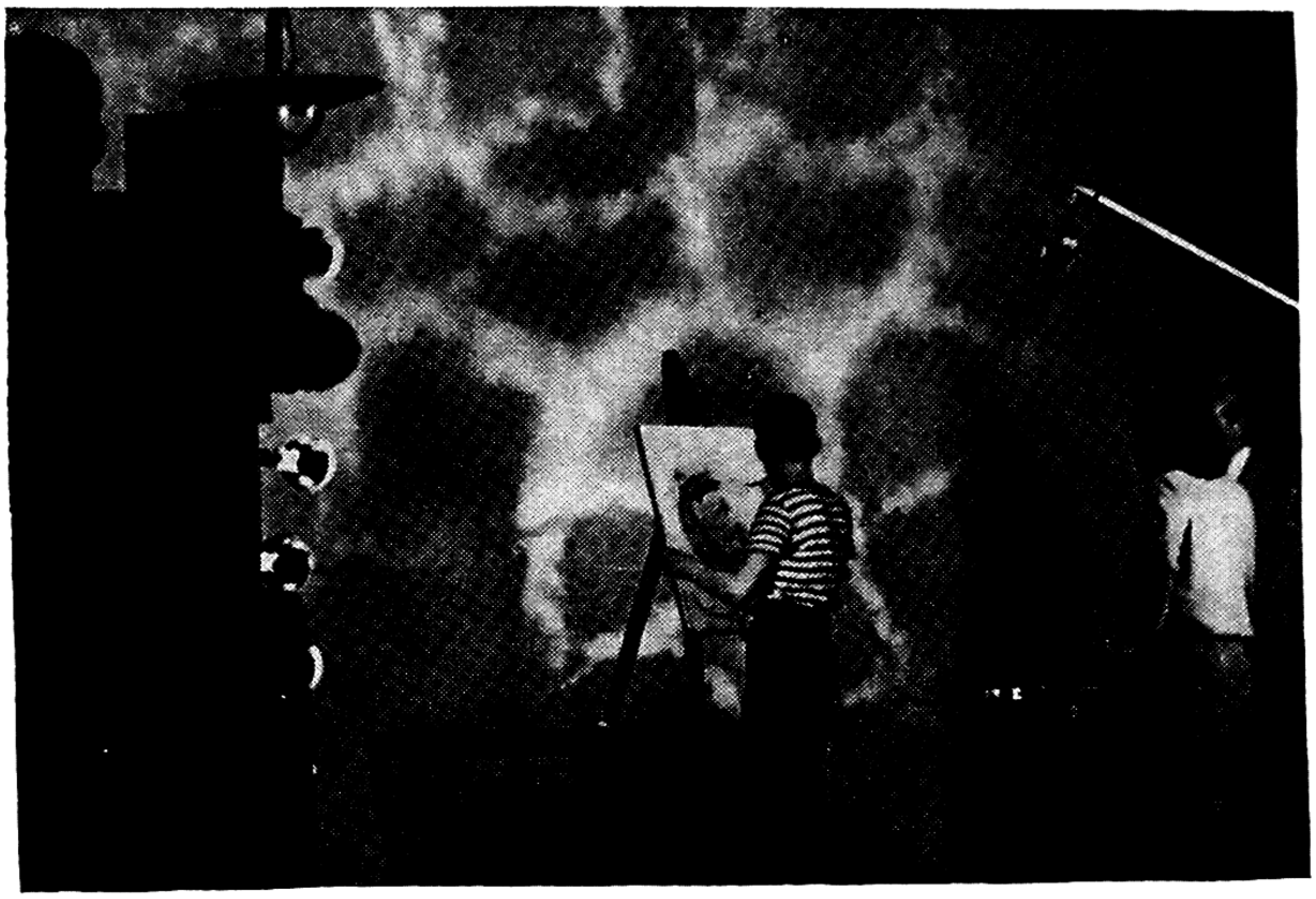
The third series was called *Careers in Science* and presented fourteen programs with an average pupil-participation of five. Topics in this series dealt with aeronautics, machines, making synthetic rubber, air pressure, carbon dioxide, dry ice, industrial chemistry, and similar science problems and concepts.

The fourth series started late in the spring of 1948 and involved only four programs, which were built around the theme *Formula for Champions.* This program was designed to present the physical education and health programs of the schools. The series showed exercises to develop speed and co-ordination, corrective exercises for posture and feet, health demonstrations, and examination. Heart soundings before and after physical activity were relayed over the air and discussed by three outstanding cardiologists.

If one is to judge from the enthusiasm of teachers and principals, the Philadelphia experiments were successful. About a thousand pupils and two hundred teachers participated in the fifty telecasts. It was found that each fifteen-minute program required at least three hours of rehearsal. One of these hours was spent in the studio before cameras. Studio personnel say that a television production requires five times the preparation of a radio program, is five times as costly, and twenty-five times as effective.

In addition to Philadelphia and New York, numerous other cities are experimenting with television. In Chicago, for example, the experimentation has led to the establishment of definite principles, and has been instrumental in providing significant programs for the schools. The work in St. Louis is also noteworthy.

Educational Television on Network Programs. Early in 1949 the first major TV network educational enterprise was announced. The plans sponsored by the National Education Association, the Boards of Education of New York City, Philadelphia, and Baltimore, and the National Broadcasting Company call for Monday through Friday telecasts in the



A School Telecast

COURTESY OF VISUAL AIDS DEPT., NEWARK, N. J., PUBLIC SCHOOLS

late afternoon. The over-all program is titled *Stop-Look-and-Learn,* and is geared for pre-high-school youth. The programs will be extended to all station cities as the NBC network expands across the country. Boards of education will be invited to participate by setting up viewing experiments with teachers and students co-operating.

The series has been planned for after-school hours in order for pupils, teachers, and parents to take advantage of the programs. At present few schools have receiving sets.

Five specific programs are planned for the *Stop-Look-and-Learn* series. They are:

1. Little Theatre—a series of children's plays adapted from the finest works of children's literature.
2. Explorer's Club—devoted to geography and history. Through the co-operation of leading explorers, this program will present some of the immense collection of films related to history and geography prepared by them.
3. Your Uncle Sam—a series explaining the work and activities of government departments. This program will include direct pick-ups from such places as the White House, Congress, and Supreme Court.
4. Science in Your Life—material pertaining to the knowledge of various fields of science, including astronomy, biology, chemistry, health, and others.
5. Folkways in Music—this program will combine folk music and folk dancing of the United States and many other lands.

Utilization for Adult Education. A great variety of adult-education programs have already been televised. These have dealt with Victory

Gardening, training air raid wardens and auxiliary police, hobbies, programs involving "How to Do" and "How to Make," and others. The WRGB Victory Gardening series started with the spading of the soil, and then was carried on through planting, cultivating, weeding, insect control, and harvesting. Farm advisers and agricultural experts participated. Subsequent programs involving food selection, preparation, and serving come to mind immediately.

Several universities are actively interested in video. Among them are Syracuse, California, Northwestern, Iowa, Creighton, and American. The University of Iowa has been interested in television since the early thirties and now has its own station, WOI-TV.

Television promises to bring more popularity to forums and discussion groups than they have enjoyed on radio, because on TV they make a sharper and fuller impact on the audience.

Currently, the United States Navy is operating special experimental television classrooms at the Special Devices Center at Sands Point, Long Island, to test TV as a medium for mass training. Among other results, the Navy hopes to have reliable data on TV as a mass instructional medium, on the type of instructor best suited to the medium, and on the type of classroom which gives maximum results. The latter phase will involve studies on size and shape of room, and screen, seating arrangements, acoustic properties, and room illumination.

Utilization for Other Professional Groups. The use of television in the field of surgery in hospitals and medical schools is being tried out. Operations at Johns Hopkins Hospital and many others throughout the country have been televised for students and physicians. Two or three hundred physicians can see a case in surgery at one time. Other scientists plan to use TV in astronomy, topographical work, and in studying the bottom of the ocean. It will be possible for a single scientist to report to a class miles away what happens in remote, inaccessible, and dangerous places, such as, in a steel mill, inside an oil well, at a volcanic eruption, and at an atomic explosion.

Utilization in Business, Commerce, and Industry. Advertising comes to mind first. Television is certainly the advertisers' made-to-order medium. Products can be glamorized and shown to their best advantage. Industry may find that television can become a night watchman, or that it may relieve the eyestrain caused by furnace glare. Bank police and

postal inspectors may be enabled to see every activity at every "cage" and the comings and goings of all who enter a building. Department stores have been experimenting with a phase of television known as Intra-Tel. This phase makes use of a "closed circuit" which is explained later in this chapter. Counters from any floor may be televised on any other floor, in lounges, and in the auditorium. Customers may thereby be induced to shop from floor to floor; thus there would be better utilization of floor space. The Kaufmann Department Store of Pittsburgh tried out intra-store television briefly, and polled shoppers on its usefulness. Of the customers polled, 77 per cent thought the plan might make shopping easier.

Utilization for General Information and Entertainment. Sports, drama, news, music, travel, and other forms of entertainment are being telecast daily. The use of television is limited only by man's imagination and genius. Baseball, football, boxing, wrestling, aquatics, racing, and other sports have not been neglected.

Political conventions, presidential inaugurations, international meetings, and local and state governments in action provide many programs of a general informational character. Many people who live in the eastern United States had the opportunity in the summer of 1948 to see three national political conventions in Philadelphia select their nominees for president. By use of network facilities, people from the east to the middle west had the privilege of watching the presidential inauguration. In St. Louis sixteen hundred students in one school saw the inauguration by "big-screen" television. A Chicago newspaper reported that many families kept their children home on inaugural day so that the children could see their history lesson.

Summing Up the Values. As yet the advantages of television are hardly more than peripheral, because its actual values have not been tested to any considerable degree. Results of experiments are not yet available, but unquestionably the educational literature of the next decade will be replete with experimental data.

Combining sight, sound, and immediacy, television will bring the world to the classroom and to the home. A tremendous psychological effect will play upon the viewers, because they will know that they are watching something that is happening at the very instant–it is not a "canned" or recorded performance, although video programs will make use of motion pictures as well as "live talent."



Primary children are ready to view the TV program, *Our Community Helpers*. Note the traffic officer, an important "community helper."

COURTESY OF RADIO COUNCIL, CHICAGO PUBLIC SCHOOLS

The voice and personality of effective teachers will be available to great audiences. Specialists in all fields of endeavor will be seen and heard all over the country. Those rural districts which are economically underprivileged will have the same advantages as the urban areas. In a given city school district, outstanding teaching talent is scattered throughout the various schools. By television, this talent can be enlisted to serve all the buildings.

Teachers are trying to learn more about television so that they will know how to use it. As yet they do not need skills so much as they need a thorough understanding of the psychological and sociological implications of this mass medium of communication. Skills can be developed later as needed. Coaxial cables and micro-wave relay networks will blanket the country in another four years. Schools must be ready.

Some Practical Limitations. Although television is a reality, there are still many practical problems to be solved before it can become a real educational instrument which the schools can successfully utilize. Some of the difficulties will be resolved in the near future; others will be stumbling blocks for many years.

1. One of the first limitations to immediate widespread use of television is the fact that broadcasting is limited to line-of-vision distances. This was explained earlier in connection with FM. To offset this, transmitters are placed on high buildings and hills. But the advantages of such place-

ment are restricted. Three proposals have been made to correct this limitation. (1) A system of relay stations from coast to coast and from area to area. Naturally, the relay stations would have to be located within line-of-sight distances. It is estimated that it would take 100 of these to span the country from coast to coast, and several hundreds more radiating north and south to cover any considerable part of the country. (2) A system of coaxial cables might be used to link up stations just as telephone lines link radio stations. The difficulty involved is expense. Current estimates place the cost of a coast-to-coast coaxial system at $100,000,000. This system would be limited pretty generally to the large centers of population. (3) A third system, proposed by a Westinghouse engineer, calls for a "stratovision" system, which involves the use of "stratocasting" planes assigned to fly over a given area at altitudes of 30,000 feet. These planes would pick up telecasts from the studios on the ground and re-telecast them to earth and on to other planes arranged in a chain across the country. This sounds rather fantastic, but the Westinghouse Company maintains that it is feasible, and would cost less than either of the preceding proposals.[1]

2. Television, FM, and other high-frequency services all suffer from this limitation of coverage. Therefore, national hookups have not been possible on a practical basis. The result is the development of a number of small, local, unrelated broadcasting units. Only one micro-wave network exists. This condition has prevented the wide utilization of outstanding talent, and also it accounts for the fact that the industry has failed to attract a lucrative advertising market.

3. Another limitation stemming from restricted coverage is the fact that rural areas are almost entirely left out of current television coverage. It may appropriately be claimed that the very areas which need television most, actually get least of it—a condition that will prevail for many years.

4. A technical difficulty lies in the fact that the FCC has allocated only twelve broadcast channels for television service, which means that no city can have more than seven stations. Television experts are concerned over this condition, because they feel that it clamps a ceiling on future developments. It is perhaps reasonable to assume that the FCC will remedy this matter of channels when television development reaches a

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[1]This proposal is fully explained by C. E. Nobles, "Making FM and Television Immediately Practicable," in *Electronics Digest*, no. 2, pp. 3–12, bulletin published by Westinghouse Electric Corporation, December, 1945.

point where further development and growth are being hindered. At present no channels have been reserved exclusively for education.

5. Television reception in some areas is now unsatisfactory on account of "ghosting," which is a matter of a double image or a shadow image in part or in whole. This is caused by delayed signals; signals are deflected by tall buildings or hills. Much complaint of this phase has come from New York City.

6. Color television has not been developed as rapidly as the public would wish. Customers hesitate to purchase black and white receivers for fear that color will outmode them. This in turn slows up the development of the industry.

7. High costs represent the biggest limitation to widespread television use. Everything about video is expensive, at least in comparison with amplitude radio. Receiving sets are expensive, programming is expensive, and the technical service is expensive. An amplitude radio station can put on programs with five people, but a television program calls for eighteen or twenty. Television programs are difficult and costly to produce. Long hours of rehearsal are necessary, costuming and staging are expensive, and "retakes" are impossible. When a program goes on the air, it must be perfect. There is no turning back. The finest in engineering skill and entertainment talent are demanded. All the equipment used is more complex. Even lighting is often a major problem and an item of high cost. The development of a new image-orthicon camera tube has eased this objection.

Where will schools find the resources to enable them to take advantage of television? There is no ready answer. Some people clamor for Federal subsidies. Others believe that advertisers may be prevailed upon to pay the bill. These same people argue that since video is a thing essentially to be seen, the daylight broadcast hours are not of much value from the standpoint of reaching factories, garages, automobile drivers, clerks, and similar groups. These groups cannot stop to watch pictures, although they can and do carry on their regular duties while listening to aural radio. Daylight hours then may not be salable, and advertisers may be found who will sponsor educational broadcasts because the schools offer an audience of some 30,000,000 students distributed as follows: kindergartens, 700,000; elementary schools, 21,000,000; secondary schools, 7,000,000; and higher educational institutions, 1,750,000. Programs paid for by advertisers would be subject to all the faults of radio programs currently

financed by advertising. Or it *might be* that sponsors will be found who will provide educational television without obnoxious advertising simply as a gesture of good will and sound public relations. This is probably no more than wishful thinking.

8. Schools will probably not be able to equip all their classrooms for television; hence, it will be necessary to fall back on the auditorium. This practice of using the auditorium as a place for utilizing radio and motion-picture programs for instructional purposes has already been condemned. Television is not different.

To the Future. Television has a long way to go before it becomes a substantial instructional tool. Only a few schools or colleges will have transmitting stations of their own in the near future. Motion pictures and FM radio stations are practical for outright ownership, but AM radio and television are not practical for many. To depend upon commercial stations and advertising sponsors is to depend upon whims and meretricious promises. Satisfactory co-operative arrangements may be made between schools and commercial stations; but as a general principle, educational authorities need control and direction of the materials and techniques which are used for instructional purposes.

There is much enthusiasm for this new medium of communication. The public is buying receiving sets about as fast as they are produced. New stations are steadily being built. Leased coaxial cables are being extended.

"Closed-circuit" television may become a real asset to schools. This type of installation ties together buildings and rooms of a school system by coaxial cable. The school has its own studio, and programs can be channeled anywhere in the system, but they do not "go on the air." No license is required for this type of telecast set. With this type of facility, the school may have its most lucid teachers, best demonstrators, or any student or student group appear before any or all of the schoolrooms in the system. The school has complete control over its programs. Such an installation may, in some cases, help solve the shortage of such specialized facilities as laboratories, spectator space in the gymnasium, and crowded auditorium conditions.

What place television will ultimately assume in formal education is largely a matter of conjecture, in spite of the fact that auspicious beginnings have appeared here and there. Controlled research is badly needed,

because there are numerous basic problems of learning for which no answers are now available. What effect will television have on the reading habits of learners? How will attention be affected? What is the degree of retention for material learned via television? How long will it take to convert teachers to readiness to use this medium if it is found to be a sound teaching device? Where will teachers be able to secure training in methods of utilization? Can television be kept free of propaganda, or can teachers train students in effective discrimination?

Finally, it may be stated rather conclusively that television is not going to supplant radio and motion pictures in teaching. It will be supplementary and complementary. The radio did not make recordings obsolete, nor did the motion picture replace the lantern slide and other still pictures. The remarkable thing about all these aids to instruction is that each seems to have a unique and special function which it alone can serve.

FACSIMILE RECORDING

Facsimile radio communication is an electronic development which is closely related to printer telegraphy, frequency modulation, and television.

How It Works. Experiments in facsimile transmission were first made in England in 1842 by Alexander Bain soon after the invention of telegraphy. After years of sporadic research, facsimile developed as radio photo, and in November, 1924, the first transatlantic demonstration was made. Commercially, it developed into wire-photo. Facsimile of today is related to these developments, but is different in that it is received in permanent form in a broadcast receiver and does not depend upon reproduction.

Facsimile may be defined as a replica of an original which is transmitted on the regular wave bands of 540 to 1600 kc. or the high-frequency waves of 42 to 86 mc. Greater fidelity and less fading are encountered in the high-frequency broadcasting.

It was explained earlier that facsimile, like television, depends upon a "scanning" process by which pictures—and graphic material, such as type, script, line drawings, or half-tones—may be broadcast and later assembled by a receiving instrument. Facsimile, unlike television, gives a permanent record which is a great asset. The analysis and assembly of the picture or script are a relatively slow-speed process. Approximately three hundred square inches of graphic material can be broadcast in an hour. Reception is usually on a paper roll eight inches wide which is

reeled off in a continuous strip very much like giant-size ticker tape. Naturally, there is a unity about the replicas and they can be cut up accordingly for practical utilization.

At the studio where the broadcast originates, the printed or graphic materials are arranged on rolls of paper similar to the rolls in the receiver. As the paper is fed into the transmitter, a photoelectric cell scans the surface, picks up reflected light, and transfers the light variations into electrical impulses which in turn are amplified and put on the air much as the voice is put on the air in radio.

Receivers pick up the facsimile signals and reproduce them on paper corresponding to the material broadcast. Several systems of printing are now being tried out, such as the photographic, electrochemical, and carbon paper method. Regardless of the method of reproduction in the receiver, the principle is the same. As the "dots" are brought into the receiver they are transferred to the roll of paper, bit by bit, in the manner they were "scanned" at the transmitter. One system employs a stylus at the tip of a moving arm which sweeps back and forth across the paper filling in the "dots" as they are picked up by the receiver. A small electric impulse oxidizes each "dot" and the white coating on the paper is blackened so that the copy is a facsimile of the original fed into the transmitter.

A facsimile recording of a newspaper is being read in an office many miles away.

COURTESY OF ALDEN PRODUCTS COMPANY, BROCKTON, MASS.



Educational Possibilities. Many educators predict an extensive use for facsimile in connection with formal and out-of-school education. They feel that facsimile can become the documentary reference for frequency modulation and for television. There is practically no end to the possible uses which such a device may serve. In the first place, it can co-ordinate FM and television broadcasts with the work of the classroom. Detailed information about forthcoming broadcasts can be furnished so that pamphlets, reprints, and advance printed schedules need not be mailed out as at present. An announcement of tomorrow's programs can be made over the aural radio, and then if the fascimile receiver is left on over night, next morning there is a photostatic copy of the programs with outlines, maps, pictures, charts, and explanatory notes ready for utilization. Listening guides, supplementary study materials, and illustrative data are quickly available to teachers and students. Even test materials may be broadcast. Music teachers may have the music score at hand when a class listens to a music program. Art teachers can have good reproductions. Geography teachers can have maps and other illustrative materials which bear specifically upon current lessons.

The manner in which facsimile complements radio is obvious in the following tabulation:

Radio Broadcast	*Facsimile Accompaniment*
Drama	Scenes, authors, actors, etc.
News	Related scenes, maps, diagrams
Music	Musical scores, artists, close-ups
English Composition	Specimens, corrections, etc.
Economics	Maps, charts, tables, data
Cooking	Recipes, illustrations of equipment and foods
Engineering	Blueprints, illustrations
Agriculture	Bulletins, illustrations of techniques and products, market quotations, etc.

Facsimile is cheaper than television because it requires no elaborate studios and no rehearsal of numerous artists. Photography, print, and sketchings provide the broadcast subject matter.

Adult education will be much more vital and dynamic, because it will not stop with the aural broadcast. Recipes need not be slowly dictated by the home-economics teacher, but can be broadcast as permanent copy.

The "how-to-do" or "how-to-make" programs will correlate with visual illustrations. Extension courses offered in connection with universities will undoubtedly be facilitated. Courses in agriculture, teacher education, homemaking, art and music appreciation, engineering, science, composition, and other subjects will have tests, charts, explanatory materials, assignments, and other permanent materials to accompany lectures and discussions.

Educators particularly interested in state-wide FM radio systems foresee facsimile as a practical instrument to co-ordinate receiving stations in a state system. This will be a part of the station-to-station detail.

Specific School Utilization. It will be recognized that most of the foregoing discussion is based upon possibilities. Few cases can be found of actual use in the schools, although newspapers, banks, and police agencies use facsimile more or less regularly. In 1939, the Cleveland Public Schools, using their broadcasting station WBOE, conducted an initial experiment. Five school buildings were equipped with receivers. The Superintendent's Bulletin and other administrative announcements were broadcast rather than sent through the mails. Student newspapers were broadcast, as also were news summaries, teachers' guides, maps, assignments, and similar material. Although the experiment aroused great interest, no conclusive evidence was adduced. Levenson summarized the experiment and generalized with these sentences:

> The evidence is by no means conclusive, yet it appears that a large school system equipped with ample duplication and delivery facilities may find facsimile of limited value. The emergencies are not so frequent that the written materials cannot be provided in ample time by the ordinary methods.



University of Miami students in journalism are using facsimile equipment.

COURTESY OF THE UNIVERSITY OF MIAMI

In rural areas, facsimile broadcasting may be of real service. If a school undertakes a broadcasting service to the home, the correlated use of facsimile has great possibilities.[2]

Other Uses of Facsimile. As further evidence of the possibilities of facsimile, it should be pointed out that it will find many applications in business, commerce, advertising, police work, public relations, and other aspects of man's endeavor. Photographs, maps, and fingerprints can be sent to law enforcement agencies without loss of time. Checks, deeds, specifications, and important papers and documents can be transmitted without waiting for messenger or mail service. The courts have already ruled upon the legality of such evidence.

Ultrafax. Two corporations have just patented a new high speed television and facsimile recorder which they call Ultrafax. The device is a combination of radio, television, and photography. It will reproduce and transmit any written or printed material, or graphic matter such as maps, charts, fingerprints, or advertising layout. It differs very little essentially from other facsimile recordings except that it is much faster, makes use of a camera, and a special receiver can record while it also shows television images. At the first public demonstration, *Gone With the Wind,* a 1047-page book, was transmitted word for word in two minutes. Of the new device, the inventor says, "as significant a milestone in communications as was the splitting of the atom in the world of energy." It has been suggested that a single television circuit can carry the equivalent of forty tons of airmail cross-country in a day. Airmail may be replaced by it someday. This would be an extension of the V-mail idea which used microfilm; the transmission in this case being by TV. Whether Ultrafax will have any significant uses in education is yet to be seen.

Some Unsolved Problems. Several problems interpose themselves between now and the time that all these things become practical realities. First, schools and homes must have receiving sets. This will come about slowly. Facsimile receiving sets are now being built into a single cabinet combined with a radio set. It is probable that the radio set of the future will be one which combines AM radio, FM radio, television, and facsimile. A simple turning of the dials will bring any one of these eye or ear media to the listening-seeing audience.

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[2]Levenson, William B., *Teaching Through Radio,* p. 462, Rinehart & Company, Inc., New York, 1945.

There are numerous technical questions yet to be solved. Some authorities maintain that facsimile can be broadcast on the regular FM channels in what is called a "multiplex transmission." Others maintain that facsimile will degrade the sound quality of FM if used in a multiplex system. If this should be the case, then separate wave channels seem to be the alternative. Such an arrangement rules out many interesting facsimile possibilities such as the permanent lecture. At present simplex transmission is employed, and since facsimile is a relatively slow process, most of this broadcasting is reserved for late at night.

The future holds much promise. Scientific aids to learning are developing rapidly. Educators do not have large sums of money to put into untried gadgets, but when these tools have proved their worth, educators cannot afford to sit back and work with the tools of past generations. A bit of good advice to schools as they look to the future is given by William B. Levenson, Associate Superintendent of Schools in Cleveland:

> Newer technical developments such as facsimile broadcasting and television await those who are now getting experience with existing media. In this field, too [FM], the best way to prepare for the future is not to sit idly in speculation, but to utilize the present. Yes, we are happy with our educational house in the radio spectrum. We invite you to join us.[3]

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Do you consider it a waste of time to include a chapter on television and facsimile recording in a text of this character, since most of the schools in which you will teach will not use these media for several years?
2. What do you think of the point of view expressed in this chapter that the best way to prepare for the future is to make optimum use of the media and materials which are already available?
3. Try to find out what is being done in your community television-wise. Comment on it.
4. It is estimated that color television will not be practical for another five to ten years. What appraisal would you make of its worth to the schools? Is it analogous to color in illustrations and in motion pictures?
5. How does television make use of motion pictures?
6. Summarize the effects of FM, television, and facsimile on extension and home education.
7. Consult your local electrical equipment dealer. Find out the cost of facsimile recorders and television receivers suitable for school use. Do you think there should be one in each building or one for each teacher? Prepare a list of costs (purchase and installation) for a city of 100,000.

[3]Quoted by Dunham, Franklin, *FM for Education*, Revised, p. 3, Misc. Bull. No. 7, U. S. Office of Education, 1948.

8. Compare the values, costs, and technical problems in "live" and "closed circuit" television. Can you draw any conclusions?

LABORATORY EXERCISES

1. A trip to the showrooms of dealers handling FM, television, and fascimile receivers will be enlightening. Try to find dealers who handle the products of such corporations as: RCA, General Electric, Du Mont, Philco, Crosley, and Farnsworth.
2. Screen and discuss one or more sound motion pictures which deal with television:
   (a) *Electrons on Parade*—20 minutes, produced by RCA. Explains the radio tube with applications to radio and television.
   (b) *Sightseeing at Home*—24 minutes, produced by General Electric. This film shows how television operates, including "scanning," studio details, and reception.
   (c) *Television*—12 minutes, produced by RCA. An interesting film from the standpoint of the studio and the camera. Shows how mobile units operate. Does not attempt to show the "how" of television.
3. In connection with the Laboratory Exercises in the preceding chapter, you were asked to prepare a radio script. If this was done, adapt the same script for a telecast if the script lends itself to this medium; if not, write a new television script.

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Chapter 19

AUDITORY EQUIPMENT

Equipment is the bottleneck to greater use of radio by teachers. Without receiving sets, teachers cannot use broadcasts; without record and transcription players, they cannot use recordings and electrical transcriptions; and without a central sound system they cannot approach maximum use of auditory teaching aids.

TYPES OF EQUIPMENT

The amount of basic equipment needed for a complete audio program is not great, yet some of the pieces are relatively expensive because they are precision tools electrically operated. Throughout this chapter the complete equipment for efficient audio utilization will be referred to as the central sound system. The parts of this system are:

1. The radio receiving set
2. The record and transcription player

3. The recording machine or recorder
4. The public address (PA) system
5. The central sound system (a complete unit)

The functions of these are, broadly speaking, sound reproduction, recording, re-enforcement, and distribution. This equipment will be discussed item by item. Not only will it be described but its use and value will be shown.

Any school contemplating the addition of audio equipment should survey its needs carefully before purchasing. Selections should be made in terms of the objectives of the school, which involve immediate needs as well as probable future needs. The superintendent of schools and the board of education should ask themselves several pertinent questions before making any installations:

1. Exactly how much use will be made of the equipment?
2. Should every room be equipped with a receiving set?
3. Should receiving sets be of the portable type or should permanent installations be made?
4. Is a public address system needed?
5. Should the record player have dual speeds? How large a record should it accommodate?
6. How large a record and transcription library should be bought?
7. Should the school plan to make recordings?
8. Should a complete sound-distribution system be installed?
9. Should all the equipment be purchased at one time, or in installments?
10. Who will be placed in charge of the equipment?
11. Will students operate the equipment?
12. If a complete sound-distribution system is purchased, where should the controls and broadcasting studio be located?

No matter how much equipment is bought or how much it costs, it must be used if the school is to justify the expense. Equipment that remains idle or is used only for an occasional auditorium or PTA program, or an emergency announcement by the principal is not paying sufficient dividends to justify the investment. Furthermore, it should become part and parcel of the instructional program of the school. This means that it must be used by teachers and students alike, just as the

books in the library and the apparatus in the laboratory are used by both teachers and students. Although the equipment is electronic in type, it is made to be used. It is not fragile, nor is it going to injure anyone. Needless to say, it will occasionally need repairs and overhauling, and this should be done by capable technicians. The operation of all this equipment is essentially that of throwing switches and turning dials and knobs.

THE RADIO RECEIVING SET

The radio receiving set which will be described at this point, refers to the ordinary radio, with or without short-wave and frequency-modulation (FM) equipment. Three different types are available—console, table, and midget. Only the first two of these are suitable for classroom use, and the first is usually not a wise choice, because of cost and lack of portability. In the main, the console model is a piece of furniture, and the school is not interested in furniture, but electronic equipment.

Selection. Selection of a radio receiving set can best be made only after actual trial in the classroom. Several sets should be tried out at one time and with the exact conditions under which they will be expected to function. They should be tested in the rooms where they will be used, and with pupils present. The names and distinguishing features of the sets in the trial should be concealed and the sets referred to only by number. Teachers and students should do the judging. Each set should be tested on each local broadcasting station and on one distant station. The test should involve both music and speech. Receiving sets should be checked against five basic criteria. They are:

1. Five or more tubes
2. Eight-inch speaker
3. "Dynamic" type speaker
4. Tone control
5. Dual reception—standard broadcasts (AM) and frequency modulation (FM)

Other desirable features, but not basic ones, are short-wave reception equipment, and automatic or "push-button" tuning. Purchases should be made from a reliable dealer and preferably from one who maintains adequate service facilities.

Radio will naturally serve the teachers best if there is a receiving set in



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In this pre-school group for the deaf the teacher plays the piano and the children, with hearing aids, develop a sense of rhythm and timing.

every classroom. If this is thought not to be possible, then portability becomes most important, because each set will have to care for several classrooms. Using the auditorium or large special rooms for listening is not satisfactory. Reception is usually bad, and, most important of all, the radio cannot be used as a part of the regular classroom instruction. The regular classroom surrounded with its various teaching materials represents the best teaching situation.

Uses and Values. Both use and value of the radio as a teaching tool have been adequately described in a previous chapter.

Radio Receiving Sets Now in Schools. An earlier chapter pointed out the fact that most classrooms throughout the United States have no radio facilities, or inadequate facilities. Inadequacy refers to dependence upon the students' bringing a portable set to school, sets in poor repair, sets which give poor reception, or sets which are expected to serve so many teachers that no one is well served.

Seerley Reid made a careful study of the radio equipment in the schools of Ohio in 1942.[1] His findings showed that 46 per cent of the rural schools and 77 per cent of the urban schools, or 55 per cent of all the Ohio

[1]Reid, Seerley, "Radio in the Schools of Ohio," *Educational Research Bulletin*, 21: 115–48, May 13, 1942.

schools had receiving sets. This would seem to be a rather high percentage for the year in question, and may not be typical of the country as a whole. More recently a survey was undertaken by the United States Office of Education, the Radio Manufacturers Association Joint Committee on Specifications for School Audio Equipment, and the *Scholastic Magazine*. Schools in forty-seven states and four territories replied to questionnaires about the equipment they now have, what they need, and what they would like to know more about. It was no surprise that radio led all other types of audio equipment in availability, and that it headed the list of equipment which the schools say they need.[2]

THE RECORD AND TRANSCRIPTION PLAYER

This machine is a phonograph which differs only slightly from the phonographs of old. The phonograph was invented by Thomas A. Edison in 1877. The new machines differ only in that they are electronic devices with more varied uses. Ordinary phonographs rotate at seventy-eight revolutions per minute and accommodate records of 10-inch or 12-inch diameters. These provide from three to five minutes of program material for each side. A development in 1948 was the so-called "LP" (long-playing) or *microgroove* record which plays 22.5 minutes on each side of a 12-inch disc. The advantages of this record over the older, shorter-playing ones are obvious. The record player which is usually referred to as a transcription player rotates at 33⅓ RPM and accommodates a record of sixteen inches in diameter. This record provides for fifteen to sixteen minutes of program material on each side. Throughout this chapter the term *record player* will refer to a machine with a motor speed of 78 RPM, and *transcription player* or *playback* will refer to the 33⅓ RPM machine.

Most commercial records are made to be played at 78 RPM, but there are educational recordings and transcriptions of radio programs at 33⅓ RPM. The best purchase is a machine with dual-speed control.

Radio stations make much use of recordings. It is reported that currently about 30 per cent of the broadcasts for independent stations are from transcriptions and recordings. Network stations take pride in the fact that most of their broadcasts are live programs. KDKA in Pittsburgh reports that its programs average about 82.9 per cent live; 17.1 per cent

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[2]Bildersee, Max U., "Report on Audio Equipment Survey," *Educational Screen*, 28: 371–72, October, 1949.

transcriptions. Radio demands a record of high fidelity. This is found in the modern 33⅓ RPM transcription.

At the time Edison invented the phonograph in 1877 he envisaged it as an educational instrument chiefly for use in connection with the teaching of music. In 1911 RCA Victor established an educational department to produce music recordings for the schools. Mrs. Frances Elliott Clark, a music supervisor from the Milwaukee public schools, was placed in charge. Mrs. Clark had begun using music records in the Milwaukee schools in 1909. The first records made strictly for educational purposes included Mother Goose songs, folk dances, art songs for children, and military marches. Newer developments will be shown elsewhere.

Extent to Which Schools Use Phonographs. The United States Office of Education survey of 1936 showed that approximately 40 per cent of the schools surveyed used phonograph records. Seerley Reid's survey of audio equipment in Ohio showed that 37 per cent of the schools of that state were equipped for playing recordings. Only 31 per cent of the rural schools had such equipment, but 53 per cent of urban schools were so equipped. Of the one-room rural schools only 6 per cent had the basic equipment. Nearly all of the schools stated that their equipment would handle 10-inch and 12-inch records at 78 RPM, but only a fifth of them could play transcriptions at 33⅓ RPM on 16-inch records.

The more recent United States Office of Education survey revealed that the standard speed phonograph is second only to the radio in amount of audio equipment owned by schools. The survey brought out the fact that as the in-school program expands the need for such equipment becomes more and more pronounced.

Uses and Values. The methods for utilizing records are much the same as the utilization of radio programs. Miller has listed ten advantages of recordings over radio:

1. The reduction or complete elimination of schedule difficulties. Sixty per cent of educational and cultural programs are broadcast at other than school hours
2. The almost total absence of station and static interference
3. The avoidance of course-of-study sequence difficulties
4. More study aids available for recordings than for radio programs
5. More effective planning by teachers since they can hear programs beforehand
6. Elimination of objectionable material

7. Repeated use of programs possible
8. Stopping of player at any time for explanation and emphasis
9. Cheapness of recordings as compared with radio
10. Use of recordings not only for reproduction, but for preserving material of historical value[3]

Two main values stand out—flexibility of use and greater permanence. These are both matters of great significance. One of the chief limitations of radio programs lies in the fact that they are broadcast at a scheduled hour and classes must use them then or not at all. Recordings and transcriptions may be used at any hour of the day, and with various sections of classes meeting at different hours. Pre-auditing and repeated playings, where necessary, have great advantages. Programs may be stopped at any time for discussion, and then continued.

Permanence is equally important. No matter how fine a radio program is, after the broadcast it is gone unless transcribed. Jacobsen has made quite a point of this weakness of radio:

> If textbooks vanished page by page as the students read them, if only one set of books could be used at a time, and then only at a certain hour of the day, taxpayers and schoolmen would be feverishly searching for a less expensive and more permanent vehicle.[4]

To the ten advantages of recordings and transcription listed by Miller, one might add several others of minor importance. When recordings are substituted for home listening to radio programs, the teacher knows that all the students are hearing the same programs and under the same conditions. Thus, the teacher controls such extraneous factors as distractions and quality of reception. Many teachers have found that recordings and transcriptions correlate better than radio with such other teaching materials as pictures, films, and blackboard. They may also lend themselves to more uses in connection with extracurricular activities and assembly programs.

Yet, recordings and transcriptions are not superior to radio in all respects. Radio will always have a place in the school program because: (1) Radio is contemporary, and transcriptions, like textbooks, can become obsolete and must be replaced with newer and fresher materials. (2) In some respects radio is more economical because after it is installed there

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[3] Miller, A. J., "Radio Receivers and Other Auditory Equipment for Schools," *Pittsburgh Schools,* 20: 128–29, March–April, 1946.

[4] Jacobsen, Philip A., "Transcriptions and Pictures," *The Phi Delta Kappan,* 22: 431, May, 1940.



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Gross sounds are introduced to these children at the School for the Deaf and Hard of Hearing through recordings before more refined sounds are given them.

are no costs for materials, whereas, transcriptions and records wear out and must be replaced, and if a school wishes to have an abundance of timely material it must be constantly supplementing its record library. (3) The ordering and distribution of records involve the same problems as obtaining films either by purchase or on requisition from a distributing library. (4) There are problems of proper cataloging of records, storing them, and caring for them. Unless records are properly cataloged, they will not be utilized. Teachers will not have the time to wade through the collection every time they need a particular program. Records and transcriptions are fragile and are easily marred and broken. In connection with storage there are problems of temperature and humidity control, prevention of warping, and space. (5) Radio and transcriptions supplement each other. Neither one nor the other is complete in itself.

Recordings and transcriptions are not "automatic teachers." They are materials to be taught. Their use must be carefully planned and integrated with the total educational pattern. There is no one way of using them. Use will depend upon purposes, subject, age and ability of students, and other factors. There are poor recordings and transcriptions as well as poor textbooks, pictures, and films. These audio materials may be used for supplying factual information, preparation of the class for discussion of important issues, analysis of varied points of view,

interest and stimulation, appreciation, provision of accurate standards or models of performance, and for many other uses.

English teachers are expanding their uses of recorded materials in significant fashion. Recordings are serving useful purposes in areas ranging from language structure, speech and diction, creative writing, to the study of drama and literature. English teachers are painfully aware of the fact that the teaching of Shakespeare today is unusually meaningless and uninteresting to the students. Some teachers feel that Shakespeare might well be dropped from the curriculum, unless some way is found to make it convey the delight that literature as art should convey. Three methods are usually employed in teaching the Shakespearean classics—character analysis, pupil dramatization, and oral interpretation by the teacher. The last two emphasize the dramatic action of the plays and the beauty of the lines. Recordings, motion pictures, and trips to the professional theatre are of great assistance to the teacher of literature, regardless of the teaching method employed.

Anyone who takes the trouble to look through the back issues of the *English Journal* will find a host of references to the use of recordings in the teaching of English. The gist of the articles is that recorded materials add enjoyment to English study, produce greater comprehension of action, lines, and characters and assist in bringing dramatic life to printed words. Many teachers report that audio devices have stimulated classroom discussion, voluntary memorization of famous passages, and a desire for further reading.

Types of Recordings and Transcriptions. There is a wide variety of types of material available through the medium of recordings. The survey of the United States Office of Education noted that the impact of recorded materials in high school was greatest in music, followed in order by English, social studies, speech, sports, and foreign languages. Recorded materials for use in the elementary school are numerous and they provide specific assistance in areas from nursery rhymes to physical exercise to pageantry to history.

It is appropriate to emphasize the availability of the types of materials upon which teachers may draw.

Music. There are recordings which deal with instrumentation and appreciation. These records treat creative music, rhythmic developments, musical form, and relationships to other subjects. By classified types there

are songs, ballads, folk songs, ballet music, madrigals, rondos, sonatas, operas, symphonies, and sacred music. Practically all of the standard classics have been recorded or transcribed. Negro spirituals, cowboy songs, and early American ballads and folk songs are abundant, as well as the operettas of Sigmund Romberg, Victor Herbert, Gilbert and Sullivan, and others.

Music is a language full of ideas and emotions. Children display a natural attraction to it as an expression of feeling. This inclination is strengthened in early years when children are given an opportunity to react to music in ways which are meaningful to them—through hearing it, through rhythms, through playing simple instruments, and through creating simple melodies. Records bring to the listener the best in composition, in performance, in time, and in locale of every kind of music. One company alone has nearly three hundred music records arranged in series from first grade level through eighth.[5] The records in this series cover almost every conceivable variety of music.

Literature and Drama. The great dramas of all times from the Greek to the modern have been recorded. Complete recordings of four Shakespearean plays—*Twelfth Night, Julius Caesar, A Merchant of Venice,* and *Macbeth*—have been made by Orson Welles and the Mercury Theatre players. Excerpts read by famous actors and actresses are available for scores of plays. Prose, poetry, famous speeches, and Bible readings are also available. Decca Records, for example, provide records of "The Man Without a Country," "Rip Van Winkle," "Lost Horizon," "Pied Piper of Hamelin," "Moby Dick," "A Tale of Two Cities," and Carl Sandburg's poetry. The narrations for these records have been done by such persons as Ronald Coleman, Bing Crosby, Charles Laughton, Walter Huston, Orson Welles, and Carl Sandburg. Other series of records provide Maurice Evans and Judith Anderson in *Macbeth,* Evans' excerpts from *Hamlet,* John Barrymore's impressive interpretation of "Hamlet's Soliloquy," and Gielgud's excerpts from *As You Like It, A Midsummer-Night's Dream, Othello,* and others.

History and Social Studies. Recordings in these areas deal with speeches, historical events, personages, social and economic theories, and the cultures of people. Probably the best known and most widely used series of social studies recordings is *Americans All—Immigrants All.* This

[5]The American Singer Series, Decca Records, American Book Company, 88 Lexington Avenue, New York 16, New York.

series was made available in 1939 by the United States Office of Education and the Committee on Scientific Aids to Learning on a cost basis. The series consists of twenty-four half-hour programs recorded both on 16-inch records at 33⅓ RPM and on 12-inch records at 78 RPM. The cost of each program and a manual is $3.75 and $4.75 respectively for the 33⅓ and 78 RPM records. Scripts were written by Gilbert Seldes. The titles are:

1. Our English Heritage
2. Our Hispanic Heritage
3. The Scots and Scotch-Irish and Welsh
4. Winning Freedom
5. The Negro
6. The French and Netherlanders
7. The Irish
8. The Germans
9. The Scandinavians
10. Closing Frontiers
11. The Jews
12. The Slavs
13. The Slavs (continued)
14. The Orientals
15. The Italians
16. Our Near Eastern Peoples
17. Other Peoples
18. Contributions in Industry
19. Contributions in Science
20. The Arts and Crafts
21. Social Progress
22. A New England Town
23. An Industrial City
24. The Grand Finale: The Making of America

Other notable series include *You Are There,* transcriptions by Columbia Broadcasting System including for example, the "Signing of the Magna Carta," "Battle of Gettysburg," and the "Trial of Charles I"; *Abe Lincoln of Illinois* (Raymond Massey); *America Calling; Cavalcade of America; Lest We Forget; Makers of History; That was the Year; The Sound of History;* and *Voices from History.*

Foreign Languages. Foreign languages are traditionally taught from textbooks by American teachers who, quite generally, have not lived among the people whose language they teach. To live with the people who speak the language is not practical; recordings and transcriptions are probably the best vicarious learning channel. Students can hear correct pronunciation and diction, as well as the inflection which means so much in many languages. Most of the transcriptions present only the mechanics of the languages, but a few can be had which give the customs, habits, and way of life of the peoples. Records and transcriptions are available in every foreign language taught in American schools.

The United States Office of Education survey brought out the fact that although recordings and broadcasts accelerate language learning, only 37 per cent of the responses indicated that audio devices were used.

Programs for Children. Pre-school, kindergarten, and elementary school programs are so numerous that it would take several pages to list them. Nearly all the classic children's stories have been told by well-known storytellers, for example, *The Little Engine That Could, The Elephant Child, Winnie the Pooh, Hansel and Gretel, Sleeping Beauty, The Children's Hour,* and *Mother Goose Rhymes.* Many of the children's stories have engaging background music skillfully blended into the story telling. In the story of *Peter and the Wolf* the orchestra assists the narrator. Each character is identified by a musical instrument after the narrator describes a scene.

Other Subjects. Few, if any, fields have been neglected. For example, there are records and transcriptions of bird calls, the noises of the animals of the zoo, war themes and events, science, biography, choric speaking, shorthand dictation exercises, health, gardening, chants of American Indians, and many others.

The foregoing pages have given the reader some idea of the enormous amount and the variety of materials that are available for educational purposes. The suggestions for utilization have necessarily been abbreviated, but they should be suggestive enough to lead to a more efficient and extended use in the classroom. The following quotation is both interesting and pertinent:

> Frequently recordings are similar to printed discussions, but an advantage of the recording lies in the fact that broadcasts are often in a style closer to conversation than are other printed materials, and hence more acceptable to the average young person. Students usually like that which by its outward form resembles what they think of as modern, and many a high-school student approaches the study of a recording more cordially than he would a pamphlet on the same problem. The recording appeals to him not only as an up-to-date device, but through the voices of the speakers gives him a feeling that it is personal and alive.
>
> No one should interpret this discussion as suggesting that books, magazines, newspapers, and pamphlets have outlived their function in the school. Such an argument would be mere nonsense. Recordings are a new and a good way human beings have of discussing with each other the experiences of life. As such they belong in the school and also in informal education.[6]

[6] *Recordings for Classrooms and Discussion Groups,* p. 4, New Tools for Learning, New York, 1943.

Sources of Recordings and Transcriptions. Records are available from many sources including several governmental agencies, national network broadcasting companies, social agencies, universities, teachers' organizations, such as the National Council of Teachers of English, local broadcasting stations, and publishing companies.

In addition to these sources, there is the school itself. Many teachers and pupils have made excellent recordings and transcriptions of their own work, which have great usefulness with succeeding classes. The possibilities of schools arranging to exchange these recordings with each other is intriguing. A school which has made a fine recording of the Gettysburg Address might exchange it for a musical recording from another school. The educational values of such an arrangement would be great. School recordings will be discussed more fully later under the heading of "recorder."

Limitations to Greater Utilization. As has already been pointed out, lack of sufficient record and transcription players in the schools heads the list of limitations to greater use of recorded materials. Other drawbacks are inadequate catalogs and catalog descriptions, unavailibility

A magnetic wire recorder is used in this high school in foreign-language classes.

COURTESY OF CHICAGO PUBLIC SCHOOLS



of many records for pre-auditing before purchase, and overemphasis on entertainment.

Some English teachers have objected to recordings on the grounds that (1) voices are harsh when recorded, (2) recordings allow no time for discussion and questioning, and (3) students prefer to do their own reading and interpretation. The first of these criticisms is probably valid, but the fault is remediable. The two remaining criticisms are faults in the use of recordings and not of the materials. In fact these criticisms underlie poor understanding of the use of the materials. No one would seriously contend that to use recordings and transcriptions would mean that student questions are precluded, or that students could not do their interpretations of the play. To this objection of the use of recordings, one English teacher has remarked, "This is like objecting to a visit with the class to the art gallery on the grounds that the students prefer to do their own painting."

Choosing a Record Player for the School. Playback machines consist of a turntable, pickup arm, amplifier, and loudspeaker. They are not particularly different from a radio. Playbacks may be purchased as separate pieces of equipment, and are usually relatively small and readily portable. The equipment may also be purchased as an attachment to be used in connection with a radio. This is an economical arrangement because nothing more than a pickup arm and a turntable are needed, since they are attached to the radio and make use of the amplifier and loudspeaker of that machine. Schools having a central sound system need no further equipment because the central sound system includes complete phonograph facilities. With such a system, programs are relayed to classrooms or auditorium in the same manner as radio programs. Some inconvenience and inflexibility will be experienced with this arrangement.

If separate record and transcription players or radio attachments are purchased, they should be checked against the following criteria:

1. They should be able to play 16-inch transcriptions.
2. They should be equipped with dual speeds—33⅓ and 78 RPM.
3. The turntable should maintain a uniform speed. The newer *rim-driven* turntable produces more uniform speed than the *spindle-driven* turntable.
4. The pickup arm and needle should not weigh more than two ounces.

5. The amplifier and loudspeaker should reproduce both high and low tones with fidelity.
6. Switches, controls, and connections should be simple, in clear view, and properly labeled.
7. The machine should play records and transcriptions either from outside-in or vice versa.
8. Automatic record changers are of little or no value for classroom use.

Caring for the Equipment. Playbacks are sturdy and will give good service without presenting difficulties. Students as well as teachers can, and should, operate the equipment. A few simple instructions will help keep the equipment in good working order.

1. Set the equipment firmly on a level surface.
2. Start the turntable and allow it to pick up uniform speed before lowering the needle to the record. The needle should be lowered to the ungrooved portion of the disc adjacent to the starting groove, and then slowly guided to the starting groove until the needle settles in the groove.
3. Use a new needle with each record or side of a record unless the machine is equipped with a permanent needle which can be used for hundreds of hours of playing.
4. Never re-use a needle after it has been removed from the pickup.
5. Use "shadowgraphed" needles since they fit the grooves of the disc best, entail least wear on the record, and give best tone quality.
6. Do not use "thorn" or "bamboo" needles because they are likely to injure acetate records.
7. Keep fingers off the playing surface of the records. Records should be stored in a cabinet away from dust, heat, and direct sunlight.
8. Remember that marred and scratched discs cannot be repaired; they are usually made of acetate and are, therefore, a relatively soft plastic substance.

Appraisal and Evaluation of Recordings. The appraisal and evaluation of records and transcriptions are as important as the selection of films. Objective appraisal forms have been found helpful. Two of these forms, both developed in connection with the Ohio State project for the evaluation of school broadcasts, are reproduced in Appendix E.

THE SOUND RECORDING MACHINE OR RECORDER

Being more specialized and more intricate than either the radio receiving set or the record and transcription player, sound recorders are more expensive and require skilled operators. Below the college and university level, schools have scarcely begun to use recorders. Where they have come into use, and are being intelligently applied, they are producing excellent results.

Strangely enough, man knows very little about how his voice sounds. He is partially deaf to the sounds he produces. He may know that his voice is not quite right, but seldom does he realize just what the trouble is, or the effect his voice has on other people. When students hear their own voices for the first time they are amazed. It is as revealing as a mirror. On hearing his voice for the first time, a student is likely to say, "My voice is terrible . . . Do I really sound like that? . . . I didn't realize that I stutter . . . I'd like to try that again." This self-appraisal is the doorstep to improvement. It has been difficult for teachers to explain precisely to students why their voices, their diction, and their use of



This wire recorder helps students to "hear ourselves as others hear us."

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words are not effective. They simply could not comprehend their faults. Teachers of dramatics, foreign languages and music have had similar difficulties. After the student hears his voice or his music, he can comprehend what the teacher has been trying to tell him. The authors of one of the studies of the Committee on Scientific Aids to Learning[7] tell two interesting and pertinent stories about a German and an Englishman who heard their voices for the first time. The German had been in the United States a year or two. When he heard his voice he was surprised at the foreign accent. He had supposed that his voice was quite natural, and that he did not have the accent so typical of others from Germany who had been in this country a year or two. The Englishman had lived in New York for twenty-five years. It was only when he heard his recorded voice that he realized that he still held much of the accent and style of speaking of the Englishman.

When students make a second recording, they usually are alert to any improvements they may have made. They watch for pronunciation, enunciation, stuttering, quality of voice, phrasing, hesitations, and other faults. If improvement has been made, there is satisfaction in achievement.

Extent to Which Schools Use Recorders. No data are available by which even an approximation can be made as to the number of sound recorders which are in use in American schools. The number is undoubtedly small, if one may judge from personal observation and from the small output of producing companies aside from those machines which are definitely known to have gone to radio broadcasting stations. Seerley Reid's survey of the Ohio schools showed that only 5 per cent of the schools of the state had recorders; 4 per cent of the recorders were in rural schools and 7 per cent in urban schools. Not a single one-room rural school had such equipment. Only one third of the schools with recorders had machines which would cut records at a speed of 33⅓ RPM, and only one sixth could use 16-inch discs.

Applications in the Modern School. Some of the uses of instantaneous[8] school recordings have already been mentioned; others come to mind immediately. They are:

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[7] *Sound Recording Equipment for Schools,* p. 10. Committee on Scientific Aids to Learning, New York, 1940.

[8] "Instantaneous" recordings refer to those which are available immediately after cutting, and can be used without any processing. This is the type of recording and transcription being discussed at this point. These recordings are cut into blank "acetate"

Analysis and Diagnosis of Speech. Students' voices are recorded and the recording becomes the basis for a program of remedial work. This is one of the commonest and most valuable uses of the recorder. It has been found to be one of the best methods to make students "speech conscious." Students of all age levels profit from this type of speech instruction. Better oral English and better reading habits have been reported by English teachers who use student voice recordings. Among the specific improvements which have been reported by teachers who have carried out carefully controlled experiments are (1) correction of multiple starts, (2) elimination of the use of "well" and "and" as beginning words, (3) ability to phrase sentences, (4) presentation of ideas without changing the point of view in the telling, and (5) ability to think in terms of sentences.

Vocal and Instrumental Music. The use of recordings in this field is similar to that in speech correction. Learners record their performances and then discuss their weaknesses with the teacher. Records are then put aside until a later time when additional recordings are made. All great artists and advanced students in singing and instrumental music record their performances and study the recording to find ways of increasing their skill. Pupils at all age levels can profit from this technique.

Teaching Foreign Languages. The need for recordings and the values of them are obvious. Techniques in using recordings in foreign languages are similar to those in English and music.

Rehearsing for Concerts: Oratorical, Debate, Dramatic. This is the final test before the public performance.

Recordings of Radio Programs for Future Use. Often a radio broadcast cannot be used at the time it comes "over the air." A transcription makes it possible to use it the next day, week, month, or semester, and to repeat it as often as desired.

Recordings of After-school Radio Programs. The uses and values here are the same as the above. This procedure enables the school to utilize many fine radio programs which would otherwise be lost. Some hardship may be encountered in transcribing after-school broadcasts unless the teacher who does the work is given consideration in his daily schedule to compensate for this extra work. These transcriptions may well be made for any teacher requesting them by the recorder operator. A fine

(really cellulose nitrate rather than cellulose acetate) or aluminum discs. More of the process will be described elsewhere.



COURTESY OF HAWAII DEPARTMENT OF PUBLIC INSTRUCTION

An excellent use for a recorder is analysis and diagnosis of speech.

illustration of how one school in Massachusetts has worked this out is reported by Francis K. Piper. (See reference at close of chapter.)

Preserving Important Contemporary Events of Future Historical Value. Special events of great historical significance are broadcast as they happen. Transcriptions of these events make an excellent permanent record which should be classified and used as reference material. Events such as the coronation of a king, abdication of a king, declaration of war, signing of peace treaties, opening of Congress, and speeches of famous personages should be in a permanent library of recordings. These events can be taken directly from the radio broadcast by the recorder.

Preparing Assembly Programs. Although the assembly program may be given as a "live" program over the central sound system, a record of these programs will often be of great value.

Recording Commencement Events. The address of the principal speaker and remarks of other program participants become a part of the permanent record of the school. Together with this auditory recording, a visual recording may be photographed for a complete record.

Editing Radio Program Lessons. Teachers often desire only fractions of several radio programs. These parts can easily be extracted from transcriptions of complete broadcasts, and a composite recording made so that all the material on the record bears definitely on the lesson being taught. In the study of taxation for example the teacher may desire excerpts

from a "Town Meeting of the Air," "The Chicago Round Table," or a local broadcast by a councilman. Bringing all these talks together on one recording saves much time, and enables the teacher to leave out extraneous material.

Demonstration and Supervisory Lessons. Recordings of these lessons may be used with teachers in other buildings or in other cities.

Aiding Public Relations. Recordings made of students' work at 78 RPM may be sent home with the student to be played for the parents on the home phonograph. Other recordings may form parts of radio broadcasts by school officials to show the community what the schools are doing.

Providing Materials for Study in the School Radio Workshop. Workshop groups use all sorts of local recorded materials for comparative purposes.

The school which has a recorder will not be at a loss to find ways to use it. After the equipment has been purchased, recordings are economical to make.

Selection of Equipment. Buy the best recorder, and buy from a reliable dealer. Before purchasing, the school should have a clear idea of the requirements which the equipment will be expected to meet. A general characteristic of the equipment should be kept in mind, and this will assure the school of equipment which will give a reliable performance for a period of time. The following criteria are suggested in selecting disc recorders:

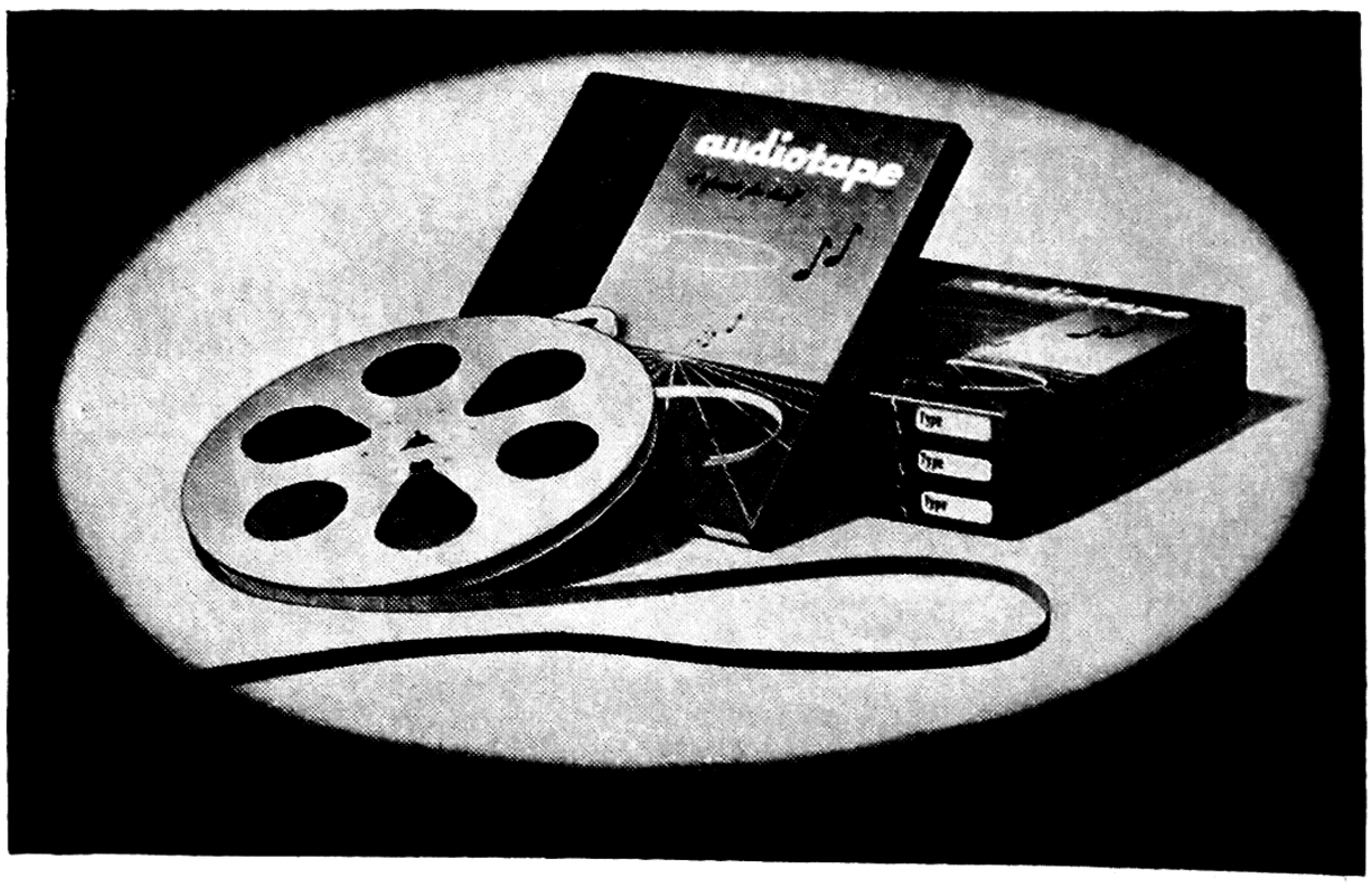
1. The recorder should be capable of operating at both 33⅓ and 78 RPM.
2. It should handle 16-inch records.
3. The recorder may be purchased as a portable unit or it may be a part of the central sound system.
4. The rim-driven turntable is preferable to the spindle-driven.
5. Recorders of the best studio type are capable of giving faithful reproduction through a range of 30 to 10,000 cycles per second, although the audible frequency band for the human ear ranges from 20 to 20,000 cycles. School recorders with a range of 80 to 6,500 cycles are sufficiently accurate.
6. Two recording turntables will be necessary if the school plans to

record radio broadcasts; otherwise parts of the broadcast will be lost as the blank discs are changed on the turntable.

7. Equipment which lends itself to the addition of extra units as improvements are made should be given consideration.
8. Such factors as durability, ease of operation, and economical maintenance should be checked.

Other Types of Recorders. The discussion of recorders so far has dealt with the disc recorder, because it is the oldest and the most highly developed. Three newer types have been receiving attention lately. At least two of them were given extensive tryouts by the Armed Services during the war. Not only were recorders used in training schools, but they were used at the front to record battles and other events. The Invasion of Normandy was completely recorded. Many of the radio broadcasts from the battlefronts to the public at home were in part or in whole taken from these recordings.

Magnetic tape recorders are comparatively new, yet they have already been pretty thoroughly tested. A message is recorded on a narrow strip of tape as the tape passes through a magnetic field. Recordings can be made and played back immediately by means of a single clutch lever. By throwing a switch the tape can be demagnetized and the recording erased so that the tape can be used again. Such a machine is obviously of great usefulness where student exercises in speech or music are to be recorded, played back, and then repeated. A completed reel can be removed from the machine and filed. Editing tape recordings is a simple matter. The tape can be cut and then spliced together with scotch mending tape. The beginning and the end of a reel of tape produce as high fidelity as the middle, a condition which is not always true of discs. Tape



Magnetic tape is neatly and compactly rolled on a small reel.

COURTESY OF AUDIO DEVICES, INC., NEW YORK, N. Y.

is not susceptible to marring and scratches. The operation of making the recording is extremely simple. Fidelity is so high that several network radio programs are produced from tape recordings. Finally, a tape recording can be played thousands of times without developing any noise because there are no grooves to widen, deepen, or hollow out. Over against these advantages, there are some drawbacks. At present there is little standardization of tapes and machines of different manufacturers. Duplicate copies of a recording cannot be made in quantity as can pressings of disc records. Lastly, a reel of tape costs about five times as much as a blank disc to provide the same length of recording; this matter of cost is more than evened up by the fact that the tape can be used over and over.

Another magnetic recorder is the wire type which is quite similar to the tape recorder except that a stainless steel wire takes the place of the tape. The electrical impulses coming from the microphone and amplifier are passed through a magnetic field. As the steel wire is passed through this magnetic field, the wire is magnetized along its length in degrees depending upon the original sound waves. Eleven thousand feet of this fine wire on a spool permit the recording of an hour's radio program. This wire may be played back any number of times, may be removed and filed for future use, or it may be de-magnetized and used over and

The wire recorder on which these boys and girls are preparing a report is simple to operate.

COURTESY OF ATLANTIC CITY PUBLIC SCHOOLS



over again. The Armed Forces used this machine with good results. It is highly portable and flexible in its uses. At present the spools of wire are more expensive than blank discs, and more mechanical ingenuity is required of the operator. On the other hand, it can record continuously for an hour, whereas the disc recorder rotating at 33⅓ RPM with a 16-inch disc can record for only fifteen minutes.

Still another machine is the film recorder, a machine used largely by the Navy during the war. This equipment employs fifty feet of non-inflammable film on which can be recorded twelve thousand feet of sound trackage, which are sufficient for five hours of steady recording at normal speed. It is claimed that the machine will record in any position, even upside down, and that it is not subject to vibration. The same machine that does the recording, does the playing back without any processing of the film. No photography is involved, because the sound tract is cut in shallow grooves on the opaque surface of the film.

Each of the four types of sound recorders—disc, magnetic tape, magnetic wire, or film—has its advantages and its limitations. It is quite likely that research will improve each in the near future as the competition among manufacturers for the school market becomes keener.

The United States Office of Education survey of audio equipment furnishes some interesting information concerning recorders. The data for the schools reporting in this survey indicate that the average number of recorders is less than one per school. Both wire and tape recorders outnumber the longer established disc recorders by almost two to one. In reporting what they need, schools indicated a four to one preference for magnetic recorders over disc recorders. Tape recorders were preferred over wire recorders almost two to one. Disc recorders were in third place.

The uses to which these newer recorders can be put are the same as those discussed earlier for the disc recorder. The earlier discussion, although it was hinged to the disc recorder, actually dealt with the general idea of recording devices, except for the specific functioning of the disc machine.

THE PUBLIC ADDRESS (PA) SYSTEM

As school enrollments have increased, larger and larger school buildings have been built. Auditoriums, gymnasiums, cafeterias, and playing fields have become exceedingly large, so large in fact, that the human voice could not be carried easily to all parts of the area at one time.

It has been necessary therefore to re-enforce the voice. Hence, the public address (PA) system came into use.

The description of the PA system will be brief, since it is a fundamental unit of the central sound system to be described in more detail later. The public address system is relatively simple. It consists of three fundamental parts—microphone, amplifier, and loudspeaker. As a unit it may be portable or stationary. It may even be assembled in such a way as to incorporate a radio receiving set or a part of the sound motion-picture projector to complete the system. It is a simple matter to plug a microphone into a sound motion-picture projector, and, by utilizing this machine's amplifier and loudspeaker, have a public address system. Such an arrangement is not too satisfactory but in many instances it will suffice to boost sound enough to play records for dances or provide music for an assembly. It may even suffice for announcements on playing fields, but such arrangements are really makeshifts.

Each part of the PA system is important. Good microphones are essential. If the sound is not carefully gathered, or if distorted, the resultant sound at the other end of the system cannot possibly have the fidelity desired. Four types of microphones are in use today, but only the crystal and dynamic have been found to be satisfactory for school purposes. There are also two models of microphones—directional and nondirectional. Nondirectional ones are usually preferred for general use, but directional models are more sensitive in one or two directions. Ruggedness is an essential quality for microphones. These instruments are easily knocked over, and in general they receive hard wear.

Electrical impulses are passed from the microphone to the amplifier, and needless to say it does not correct any distortions received in the impulse. The amplifier merely re-enforces the impulse received. Good amplifiers are abundant. The chief caution in the matter of amplifiers is to select one large enough to do the job required of it. In normal use, it should not be necessary to turn the volume all the way up; thus there is a margin of safety in reserve.

Loudspeakers receive electrical impulses from the amplifier and transfer them back into sound waves. One caution seems sufficient here. As in the case of amplifiers, they should be large enough to do the job required. The usual recommendation is that average-sized classrooms should be outfitted with 8-inch speakers, and larger rooms with 10-inch. Auditoriums should have dual speakers.

The number of loudspeakers which can be hooked up to a PA system depends upon the amplification. Most schools having a simple PA system do not attempt to distribute sound over more than a few loudspeakers at a time. If greater distribution is needed, the more elaborate equipment of the central sound system is recommended.

Radio programs or phonograph recordings may be amplified on the PA system. This is done best by having an amplifier panel with a separate channel for each function. Satisfactory results cannot be expected from placing the PA microphone in front of the radio speaker or record player and hoping that the sound will be properly reproduced.

Many schools, large and small, are equipped with PA systems. Extended educational use is made of some of them, but others are used only in connection with formal assembly programs, or extracurricular activities for large groups. The public address system can provide the school with the facility of a good, if somewhat limited, auditory program. Its microphone holds all the fascination of the radio microphone.

THE CENTRAL SOUND SYSTEM

The central sound system is a composite of the audio equipment discussed in this chapter; but it is more than just pieces of equipment—it is the integration of this equipment into an organized system. The keystone of this equipment becomes the panel board where the controls for the public address unit, radio reception and distribution facilities, recording and transcription player, and the recorder are located. Such a system has many advantages, and also, several limitations. The central sound system is frequently referred to as the sound-distribution system, or the radio-sound system. Central sound system is the term more generally used.

The simpler public address system which came into use about 1927 was the forerunner of the central sound system. As has been explained above, it was adequate until buildings became larger, and school systems worked out more comprehensive and organized audio programs. At first only a few teachers used the radio for classroom listening, and quite naturally each had his own receiving equipment, or the equipment was moved from room to room. Later, other teachers desired to utilize the radio for classroom listening. The problem then was whether each room should be provided with individual receiving equipment or whether

a central receiving unit with distribution to the various rooms should be installed. The merits of the two systems are essentially this: if teachers wish to use this aid with the least possible inconvenience and without much regard for other auditory aids and values, the individual receiving sets seem preferable; on the other hand, while central equipment is less flexible and causes inconvenience, it does provide the opportunity for students to make maximum use of the microphone, transcriptions, and recordings. Individual radio receiving sets in each classroom become an expensive item. Central sound systems are expensive, too, but they provide so many more additional services that the expense seems justified.

Purpose and utilization should not be overlooked. The equipment must be used in an organized program; not merely for an occasional announcement or an assembly program. Probably, school boards at first were willing to buy central sound equipment because of administrative and supervisory conveniences, but it was soon learned that the equipment had great value for classroom instruction—radio listening, production, and analysis of students' performances—and for the extracurricular activities of the school. It can bring reality to club activities, and in numerous ways tie the extracurricular activities of the school closer to the curricular.

Too frequently the central sound system panel has been installed in the principal's office, thus lending weight to the belief in many quarters that the chief purpose of the equipment is administrative. Another condition fostering this belief is the fact that the principal was often the only person in the building who was instructed in the operation of the equipment at the time of installation. Both of these conditions present grave limitations to an intelligent use of the equipment. Nevertheless, the equipment does serve many administrative purposes.

Extent of Use in Schools. Data are unavailable as to the number of central sound systems in American schools. Again it is necessary to fall back on the survey of audio equipment in the schools of Ohio. Reid found that approximately five hundred schools, or 11 per cent of the total number, had installed this equipment. The majority of this equipment was in the secondary schools in the urban areas. The survey also showed that of those schools using central sound systems, loudspeakers had been installed in 89 per cent of the classrooms, 76 per cent of the auditoriums, and 69 per cent of the gymnasiums.

Applications in the Modern School. The Ohio survey also listed the uses to which schools put their central sound systems. They were: reception of radio programs for classroom listening, 74 per cent of the schools; administrative purposes, 71 per cent; broadcasting of talks and speeches, 62 per cent; broadcasting of student dramatizations, 55 per cent; and the broadcasting of recorded programs, 39 per cent.

The above listing of uses shows the main purposes to which the equipment is put in most schools, although some have evolved other uses. These uses can be classified under the headings of administration, instruction, and general school activities.

Selection of Equipment. If the cautions and suggestions already made for the selection of radio receiving sets, recorders, phonographs, and public address systems have been carefully noted, it is obvious that little more can be added, except for a few words about the control panel.

1. The panel should provide for two or more input channels; otherwise only one program at a time can be picked up and distributed.

2. Provision should be made for an input-mixer so that two or more microphone and recording attachments can be used simultaneously. In a drama production, for example, one or two microphones may be needed for the cast, another for background music, and still another for the use of recorded sound effects. Only with an input-mixer can these be properly blended by fading or accentuating parts as called for in the script.

3. Switches should be so arranged that it is possible to release a program to a single room, a group of rooms anywhere in the building, or to all the rooms.

4. It should be possible to pick up a microphone broadcast which may originate in any room in the building instead of the studio, and to distribute the sound wherever desired. To this end microphone outlets should be installed in the auditorium, speech rooms, music rooms, gymnasium, cafeteria, and other rooms in which programs might originate. The majority of the programs will, however, originate in the studio or control room.

5. The central sound system should allow for future expansion of audio facilities. Frequency modulation is now a reality. Any sound system which cannot handle FM is outmoded.

Placement of Equipment. The general practice seems to be to place the central sound system cabinet in the principal's office. Here and there

a school is found with a special radio room. No matter how convenient it is for the principal to have the panel in his office, common sense tells us that this is poor placement. The principal's office was never designed for auditions, rehearsals, and broadcasts requiring the use of piano, orchestra, playbacks, and sound effects. The ideal location is an acoustically treated suite of rooms with connecting doors and glass partitions. The arrangement should include a small control room, a large and a small studio, and, desirably, a visual audience room.

Operation of Equipment. Central sound systems can be elaborate but they are not so mysterious as some seem to think. It is true that a competent operator or operators are needed, but every function of the equipment follows definite procedures and all switches and plugs are labeled. At first sight the panel board is a dazzling array of dials, clocks, switches, and sockets for monitors, inputs, mixers, recorders, and microphones. Technical training is needed to know what goes on behind the panel, but, in front, ordinary intelligence and instruction from the engineer installing the equipment plus the printed booklet of directions are enough to ensure proper operation. Adjustments and repairs should be made by trained service men.

Ordinarily schools place one or two teachers in charge of the equipment. Such persons as the radio teacher, visual education director, or the physics teacher are logical selections. Quite naturally the principal should know how to use the equipment to care for his needs. Mechanically inclined students can be relied upon to provide useful assistance in operation (never for repairs) after they have had training. Responsibility for the equipment should be concentrated. After every broadcast, all switches should be thrown to the "off" position and the dials set at zero. Pupils should not be allowed to "visit" the control room, either singly or in groups, except on scheduled visits with the responsible teacher-operator present. It was suggested in an earlier chapter that students who act as motion-picture projector operators should be trained, given definite schedules, and be school-licensed. Student audio operators may be handled in like manner.

Woelfel and Tyler give the simplest and most straightforward advice to inexperienced operators which the author has come upon. It is:

> . . . remember that electric current, as it courses through the equipment, acts much like water flowing through pipes. A valve shut off at the main

intake pipe shuts off all the faucets and fixtures in the whole system. Rough use of valves and fixtures will cause leaks. A valve left open is wasteful. A valve turned on too quickly will release a splash. A child knows that a faucet must not be left running. But forgetting to turn switches off and dials to zero is probably the most frequent cause of damage to central sound systems. The first and last operation in using the central sound system should be to set every switch at "off" and every dial at "zero." Since central sound systems vary so widely in complexity and in the design of their controls, the specific directions for operation supplied with the equipment should be carefully followed.[9]

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Make a survey of the audio equipment in the various schools of a county, a township, or a city school district. Find out, also, how it is used.
2. Prepare a code and a short objective test which would form the basis for the selection of student auditory-equipment operators, or assistants.
3. Prepare an audio-equipment schedule for a school with (a) eight teachers, (b) forty teachers, and (c) a hundred teachers. This schedule should be complete as to amount of equipment, types, approximate costs, and manufacturers.
4. Prepare a record bibliography for some subject area. Annotate the content; include size and speed, cost, and sources from which the records may be purchased or rented.
5. Select five recordings not listed in Miles' *Directory* and evaluate them. Use the evaluation forms in Appendix E, or prepare a new form.
6. Outline a program for the administration of records and transcriptions for your school.
7. Report on some of the studies, findings, and recommendations of the National Council of English Teachers on the use of radio and recordings in the teaching of English.

LABORATORY EXERCISES

1. The properly equipped audio-visual laboratory in institutions offering audio courses should have at least one example of each apparatus discussed in this chapter, except possibly the central sound system. Each student in the class should gain a working knowledge of the apparatus.
2. Record the voices of every member of the class. Play back and discuss. (If the institution does not possess a recorder, arrangement can be made for this at a local radio broadcasting station.)
3. Try out as many different kinds of apparatus as possible—microphones, amplifiers, loudspeakers, cutting heads, aluminum and acetate disc records, pickup arms, needles, etc.
4. Familiarize yourself with wire and tape recorders as well as disc recorders.

[9]Reprinted by permission from *Radio and the School*, p. 344, by Norman Woelfel and I. Keith Tyler. Copyright 1945 by World Book Company.

5. By all means make a trip to a local radio broadcasting station. In addition to checking on broadcasting facilities, find out how much time is devoted to educational broadcasts. Are these programs "live" or recorded? Does the station take a favorable attitude toward educational programs? Does it know the size of its listening audience for various types of programs? Summarize the data gathered, and evaluate the significance of the station to the community as an educational institution.

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Part FOUR



THE ADMINISTRATION OF THE AUDIO-VISUAL PROGRAM

Part Four is not for administrators only. It is meant for classroom teachers as well. Their understanding and sympathy for the administrative problems are essential in an effective program. The administrator of an audio-visual program will need to have knowledge which includes a general overview of current uses of a-v materials and a professional attitude toward scientific materials of instruction if he is to develop a well-integrated department. The chief principle set forth in this discussion is that a-v materials are not discrete and isolated, but are actual learning materials themselves and must be integrated into a co-ordinated educational program. Emphasis here is on the organic, functional point of view regarding audio-visual materials.

20. THE AUDIO–VISUAL PROGRAM



Chapter 20

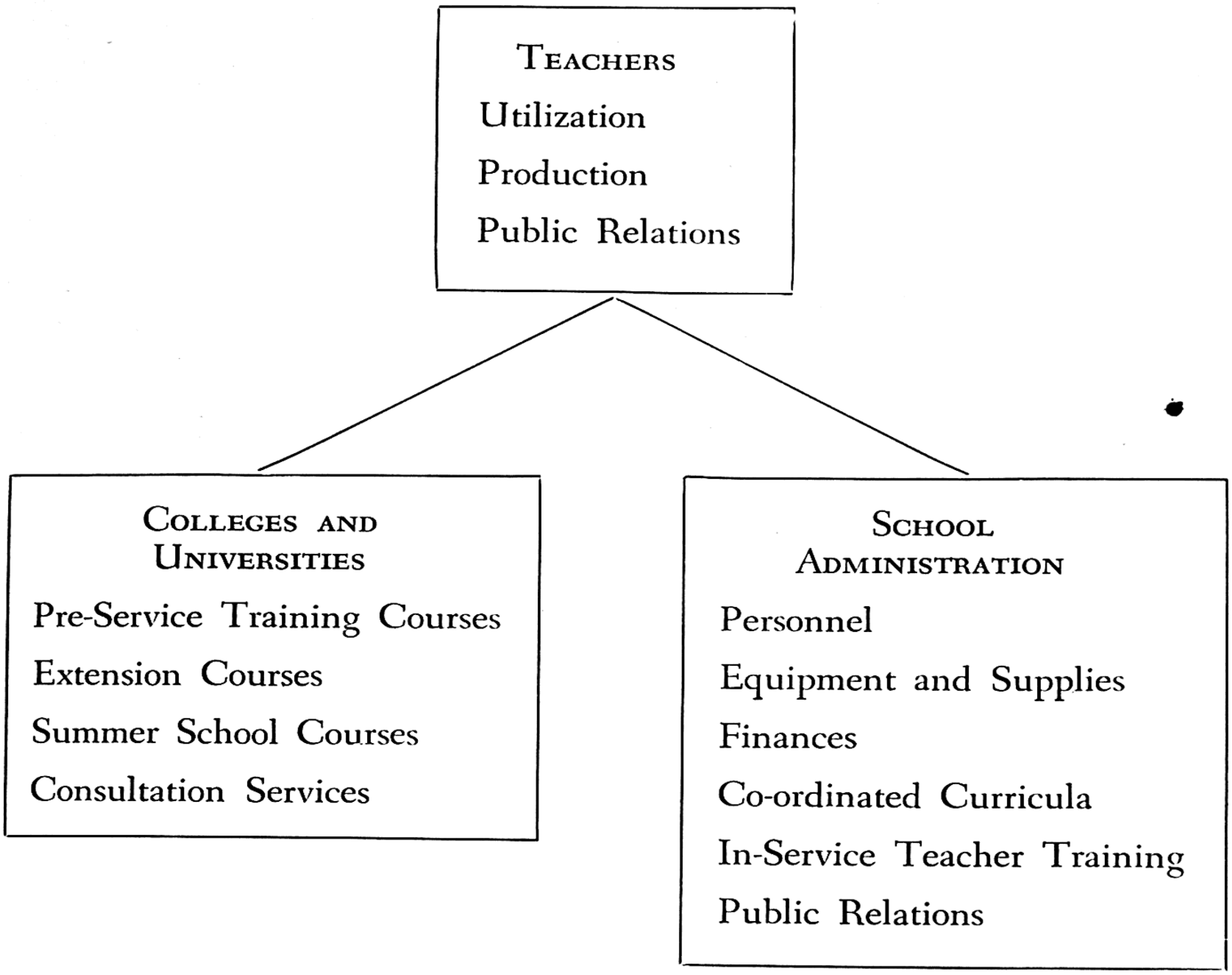
THE AUDIO–VISUAL PROGRAM

An audio-visual program, no matter how large or how small, presents numerous administrative problems, and the more efficiently these problems are solved, the more effective the program will be. Many of these problems because of their scope and over-all nature fall on the shoulders of the school administrator. But, the teachers are the ones who actually utilize the materials, and the ones on whom ultimately the effectiveness of the program depends.

Preceding chapters have stressed the part which the teacher plays in an audio-visual program. He is the one who actually uses the materials and techniques. Many of the charts, graphs, slides, and other materials he will have to provide or produce himself. The more complicated and expensive ones, such as films, filmstrips, and records will be furnished him just as textbooks, encyclopedias, and laboratory equipment are furnished him. Always, the teacher is a key person in good public rela-

tions, and much of the public's reaction to the introduction of a wide use of audio-visual materials in the schools will depend upon him.

The three aspects of a maximally effective program can be well illustrated by the following diagram:



The administration of an audio-visual program involves school administration, colleges and universities, and the teachers.

Colleges and universities play a prominent part in effective audio-visual programs in the public and private schools. They have the responsibility of the pre-service education of the teachers. If education courses are attuned to the current educational philosophy, they will place the pupil and *experiencing* at the heart of the curriculum. The further responsibility of these institutions of higher learning lies in their willingness to provide extension courses, summer school courses, and consultation services. The school superintendent and building principal have a

right to expect that the training institutions have given young teachers entering the profession an understanding of audio-visual aids; what they are, why they are significant media in the educational process, and how to utilize them effectively in the classroom.

This chapter, however, is basically concerned with the means which each school system must employ to facilitate the efficient and smooth functioning of the audio-visual program. These are the problems of organization and administration which must be faced if a school proposes to make a thorough-going use of the a-v instructional materials. A knowledge of these problems is valuable for administrators, audio-visual directors, and classroom teachers. Every teacher should feel that a chapter on administrative problems concerns him. These overall problems are closely related to the day-to-day work of everyone using audio-visual materials.

To achieve a dynamic and functional a-v program, personnel must be provided who will see that materials are in proper condition and reach the places where they are needed at the right time, and that the teachers have some expertly trained and interested persons to whom they can turn with their many problems. Not only must buildings be equipped, but operators must be trained, repairs and general maintenance cared for, and a system of records and reports installed. Someone must have the responsibility of determining the amount of money which should be allocated to the program and how the money should be spent. If a school has a large number of its instructional personnel who do not understand the "how" and the "why" of audio-visual aids, a program of in-service education is imperative. It has also been found that most efficient results cannot be obtained unless audio-visual techniques and materials are closely co-ordinated with the total school curriculum. Planning for this type of co-ordination calls for administrative understanding.

PERSONNEL

Someone should be given administrative control over the program. It is the only way in which confusion can be avoided and optimum use made of whatever equipment the school possesses. In the small school system the person in charge of the program will devote only a part of his time to these duties. In the large system, the magnitude of the program will demand a full-time person and often a staff of considerable size. In

the city of Los Angeles, for example, the Department of Audio-Visual Education employs a full-time supervisor with a staff of eighty. This staff has seven certified members, seventy classified members, and three full-time teacher-consultants who work on the development of instructional materials. The major units in this organization are Head Supervisor of Audio-Visual Aids Section, an Assistant Supervisor in charge of elementary schools, an Assistant Supervisor in charge of secondary schools and junior colleges, and a Supervisor in charge of radio education. This staff serves 340 elementary schools, 33 junior high schools, 45 senior high schools, 11 schools for handicapped children, and 3 junior colleges. The 1948–1949 budget for audio-visual education was $424,000.

A publication of the American Council on Education[1] recommends that every city with a population of twenty-five thousand or more should have a full-time specialist in audio-visual education. In smaller cities, the program should be placed in the hands of a qualified person, who should be relieved of other duties so that his audio-visual responsibilities are not simply added to an already busy schedule.

The Director. Both large and small systems, and individual buildings in the larger systems, need a director of the audio-visual program as already explained. Co-ordination of the activities of the program can be achieved in no other way. Committees of teachers are helpful in an advisory capacity, but committees cannot do the administrative work which a program requires.

The qualifications of the director should include the following: (1) three to five years of successful teaching experience, (2) specific training in the field of audio-visual materials, (3) interest and enthusiasm for audio-visual techniques, (4) familiarity with the content of the field—films, filmstrips, maps and globes, records, and transcriptions, (5) organizational and administrative ability, and (6) knowledge of curriculum construction and textbook developments. These qualifications are posited so that there is assurance that the director will know the problems of the classroom teacher and curriculum materials, and will have the technical knowledge and ability to organize and co-ordinate the entire program. In every case, the director must be a person who has a broad educational background. This is not a job for a narrow specialist. Professional experi-

[1]Seaton, Helen Hardt, *A Measure for Audio-Visual Programs in Schools*, p. 33. American Council on Education, Washington, D. C., 1944.

ence at several grade levels is desirable, because this helps the director to understand the use of curriculum materials with children of different ages and levels of ability. A knowledge of child psychology—especially of interests, motivations, and abilities—is highly desirable. It should also be understood that the qualifications include a knowledge of and sympathy for current, social, economic, and political needs.

Why demand of the director qualifications of such breadth and variety? They must be commensurate with the duties and responsibilities which fall to him. Some of them are:

I. Administrative
  1. Organizing a department or center of audio-visual materials
  2. Preparing and supervising the expenditure of a budget
  3. Co-operating with school architects on the functional planning of new buildings and remodeling of old structures
  4. Promoting public relations, involving
     a. Working with community groups
     b. Preparing publicity
  5. Reporting to the superintendent of schools

II. Supervisory
  1. Promoting an in-service teacher education program
     a. Conferences
     b. Credit or noncredit course work
     c. Demonstrations, screenings, etc.
  2. Consulting with teachers regarding utilization of materials
  3. Consulting with teachers regarding material needs
  4. Visiting schools
  5. Issuing bulletins, newsletters, and information on availability and utilization of materials

III. Technical
  1. Selecting and purchasing machines, films, slides, filmstrips, records, and supplies (with the co-operation of committees of teachers and other personnel)
  2. Maintaining a library
  3. Classifying and cataloging materials
  4. Circulating materials

5. Repairing and maintaining materials
6. Keeping records
7. Producing materials such as slides, filmstrips, motion pictures, charts, models, flat pictures, exhibits, and records

Naturally the duties and responsibilities of the director of the Department of Audio-Visual Materials will be determined by the size of the school system, yet many of the duties listed above are common to all situations—large systems, small systems, individual buildings. Furthermore, the duties of the director will be considerably expanded if he directs an extensive audio program involving studios and the production of programs. In the smaller systems it seems possible to organize both the visual and audio activities under one head, but in large school systems where an FM radio station is maintained it may be appropriate to separate the two departments and to have two directors whose responsibilities are co-ordinate. These two individuals and their departments would of necessity work together closely.

Other Staff Members. The duties outlined above are far too comprehensive for one person to care for them all. Clerks and secretaries are needed for classifying and cataloging materials, and for keeping records of requisitions and incoming and outgoing materials. Materials must be scheduled and inventories made. Technicians are needed to repair and maintain films and machines. An expert projectionist may be needed to instruct teachers and student operators, and to assist community groups with their programs. Large school systems usually employ school trucks for daily or weekly distribution and exchange of materials. The drivers of these trucks are a part of the personnel of the department and should have some understanding of the nature of the materials they handle. Any school that proposes to produce photographs, slides, filmstrips, or motion pictures will need specially trained technicians for this work. Consequently, no one can say categorically how much of a staff a department needs. The scope of the department will determine this.

Equipment and Supplies. It is impossible to say just how much equipment and supplies are needed, except to lay down the principle that teachers should expect the city to furnish them with the appropriate materials, in sufficient quantity, and at the time they are needed so that the educational development of the pupils is maximally provided for.

The phrase "too little and too late" has sad connotations in the audio-visual program.

Probably the best standards which have yet been set up for minimum audio-visual needs are those outlined by a Committee on Visual Aids of the American Council on Education.[2]

1. One 16-mm. sound projector for every 200 students*
2. One filmstrip projector for every 200 students*
3. One 2" x 2" projector for every 400 students*
4. One 3¼" x 4" projector for every 400 students*
5. One set of 35 stereoscopes for every 400 elementary pupils*
6. One opaque projector for each school
7. One table-type radio for each classroom
8. One two-speed, portable 16-in. transcription player (complete with speaker) for each 200 students, or one per building where enrollment is less than 200
9. One microphone for use with playback or projector for each school
10. Wall type screens or suitable projection surface for each classroom, or one per building where enrollment is less than 200

The following additional equipment is desirable:

1. Sound filmstrip projector
2. One wire or tape magnetic recorder
3. A sixteen-inch disc recorder
4. A central sound system
5. A portable public address system
6. Additional microphones
7. Photographic equipment
8. Kits for making lantern slides
9. Overhead projector
10. Microfilm reader and micro-projector
11. Maps and globes for every classroom
12. Radios equipped for both AM and FM reception

Possible future equipment recommendations:

1. Facsimile receiver
2. Television receiver

Costs for the equipment noted vary greatly and fluctuate from year to year. Slide-making kits cost only a few dollars, but central sound systems with two channels may reach as high as several thousand. The equipment

[2]Seaton, Helen Hardt, *ibid.*, pp. 36–37.

*Or one per building where enrollment is less than the number specified.

in the list recommended by Seaton will vary in purchase price from approximately $25 for a beaded screen to $500 for a sound motion-picture projector, and motion pictures vary from $25 to $100 per reel. Film rentals will range from $1 per day up.

All of this equipment must be maintained and kept in first-class working condition. Films should be inspected after each booking, repaired if need be, and a cumulative record of the physical condition kept on file. From time to time, some of the equipment will need complete overhauling, and in some instances will have to be returned to the factory for re-building unless the department of audio-visual education is large enough to maintain factory-trained repairmen. The work of general overhauling should, insofar as possible, be scheduled for the vacation months so as not to interfere with the actual functioning of the instructional program. Since the a-v staff members are employed on a twelve-month basis, the summer months are ideal for putting all materials and equipment in shipshape condition.

The selection and purchase of materials place a heavy responsibility upon the director of the program. It is imperative that he know types and qualities of materials, and in general keep himself up-to-date on developments in the field. Although he will have had actual experience in the classroom use of these materials, he will want the advice of teacher committees when considering selections to be purchased. Films considered for purchase should be evaluated and appraised by the teachers who will use them. No one is better able to pass judgment upon the value of primary films than the primary teachers, but their judgment, too, should be supplemented by that of supervisors and their visual director. A representative from the bureau of curriculum research and development should also be a member of the film evaluation committee. Some schools have adopted a policy of withholding purchases of films until they can actually be tried out with pupils. This is, of course, the final test. Incidentally, it is often helpful to have the pupils make an evaluation of the films. Every school system should have numerous committees constantly engaged in screening and evaluating materials.[3]

Availability and Requisitioning. After materials have been evaluated, purchased, and properly accessioned in the a-v library, they are ready for use. Teachers throughout the school system must be informed of their

[3]See Appendixes C and E for suggested evaluation forms.

availability. This leads to the preparation of a catalog with descriptions of materials which can be requisitioned for use. Good catalogs invariably lead to extended and wiser utilization of materials.

Requisitions for materials are handled in one of two ways: teachers submit their requisitions directly to the central department of audio-visual materials, or building requisitions are sent to the central department. In the latter case, teachers turn their requisitions over to a building coordinator of a-v aids who in turn passes a composite building requisition on to the central department. The latter method is preferred. Schools which rely on renting materials from sources outside the school system follow much the same procedure.

Materials are received by the school at some central office or room, such as the school office, bookroom, supply room, or receiving room. Naturally these materials should arrive well in advance of their scheduled use so that teachers can preview them and plan intelligently for their use.

In Chapter 11 reference was made to projector operation by teachers, students, and other personnel. Operators, too, must be apprised in advance of showings. Weekly mimeographed schedules of what films will be shown, when, and where, and by whom are recommended for each building. Teachers are thereby informed of the materials which their

Corner of a Shipping Room in a Central A-V Office

PCW FILM SERVICE



colleagues are using, and of materials which they might like to know about.

One or sometimes two reports are involved in each motion-picture showing. Teachers are usually asked to fill out a report which indicates how they used the film, and to give an estimate of its value for the purpose it was used. In schools which use student operators, the supervisor of operators usually asks each one to fill out a brief report stating the number of people present, where the film was shown, the condition of the film when he finished with it, and probably a statement regarding the condition of the projector.

Records and Forms. Any well-organized and administered audio-visual program will require the use of various records and forms. The variety and extent of such records will depend upon many factors, such as: number of buildings in the school system, whether the school owns or rents most of its materials, amount of money available for rentals, whether schools evaluate materials prior to class use, type of operators used, whether buildings have a separate director or whether audio-visual administration falls on the principal, and whether films and other materials are booked by semesters or "spot" orders. Standardized forms facilitate the work of administering the program and assist in getting the right materials to the proper place at the correct time. Records will form a backlog of informaion of great value in making future purchases or rentals, formulating budgets, bringing about more intelligent utilization, and putting the entire program on a business-like basis. Needless to say, records and reports should not be sought unless they serve some useful purpose. The people who use the materials have enough to do without becoming involved in any unnecessary red tape.

It is not practical to show specimens of all forms used in an expanding a-v program, but some forms are so universally used and so nearly indispensable that it seems advisable to call particular attention to them. The treatment here is suggestive and representative, not comprehensive.

Every school finds it necessary to assist the teachers in placing their requisitions for films, filmslides, slides, and transcriptions. Good administration necessitates the consolidation of these requests into as few orders as possible for each building so that innumerable small requisitions are not sent to the central office or to rental agencies. Naturally, consolidation of orders facilitates accounting and financial arrangements. The principal

of each building or the director of a-v education should send a bulletin to every teacher setting forth the school's policy regarding the purchase, rental, and requisition of materials. Each teacher should then supply the office with a written statement of needs. If the city provides its own library of materials, the teachers' requisition form is simple. It need consist of nothing more than a mimeographed or printed sheet asking for the following information. (See also the form in Appendix F, used by the Los Angeles Public Schools.)

COMPLETE TITLE	CAT. NO.	TYPE OF AID (FILM, SLIDE, ETC.)	DATE NEEDED	
			FIRST CHOICE	SECOND CHOICE

Form for Requesting Materials from the School's Own Audio-Visual Distributing Library or Center

If materials are to be rented from sources outside the school-owned library, additional information will be needed. The form should include the following:

TITLE AND CATALOG NUMBER	TYPE OF AID	NAME AND ADDRESS OF SUPPLIER	DATE NEEDED	
			FIRST CHOICE	SECOND CHOICE

Form for Request of Rental Materials

As soon as all requisitions have been submitted by teachers, the building director of the a-v program consolidates the orders into a building

requisition which is sent to the central library. A consolidated rental order is made up in the same manner. Appendix F shows the requisition forms used by the city schools of Pittsburgh and Los Angeles.

Ideally, the building principal or a-v director sends the teachers concerned a confirmation of their requests as soon as he receives this information from the library or purveyor. This arrangement keeps each teacher fully informed as to just what he can expect in the way of materials. Instead of notifying each teacher separately of the status of his requisition, some schools prepare a "Master Chart" of materials ordered for the semester or month. This may also be done on a weekly basis. It is then possible to schedule projectors and other equipment without confusion. A weekly bulletin may be a simple compilation such as the following:

Week of April 3, 1950

COMPLETE TITLE	TEACHER—ROOM—SUBJECT	TYPE OF MATERIAL	DATE	PERIOD
How to Conduct a Meeting	Jones–115–English 11B	Sound film	3, 4, 5	5, 6
How Nature Protects Animals	Evans–202–Gen. Sci. 9A	Sound film	7	4, 7
People of China	Phillips–127 Social Studies 10B	Slides	5	1, 2
Here is China	Phillips–127 Social Studies 10B	Sound film	6	3

A Weekly Schedule Whioh Shows What, When, and Where A-V Materials Will Be Used in the Building

Appendix F shows several other forms which the teacher and director of audio-visual aids will find of value.

HOUSING THE BUREAU OF AUDIO–VISUAL MATERIALS

It does not seem desirable to present a blueprint of a floor plan for the large city, college, or university a-v center, because of the variety of local conditions which will have to be taken into consideration. There are, however, certain services which have to be arranged for in all programs;

hence there is standardization in room "types" although not in size or arrangement. The following rooms and space are needed:

1. Offices for the director and assistants
2. One or more general offices for secretaries, stenographers, booking clerks, order clerks, and catalogers
3. Shipping and receiving room with outside platform
4. Film repair room or repair space in some other room
5. Humidified storage for films and filmstrips
6. Supplies and equipment room
7. Accessioning room for checking in new materials and preparing them for circulation
8. Demonstration and screening room with equipment kept set up ready for use
9. Library for catalogs, books, news files, and journals
10. Exhibit room for maps, charts, globes, models, etc.
11. Photographic room for camera work
12. Shop room for repair of equipment
13. One or more conference and committee rooms where teachers may meet and work on courses of study, discuss evaluations, etc.
14. Laboratory or work room for production of slides, maps, charts, etc.

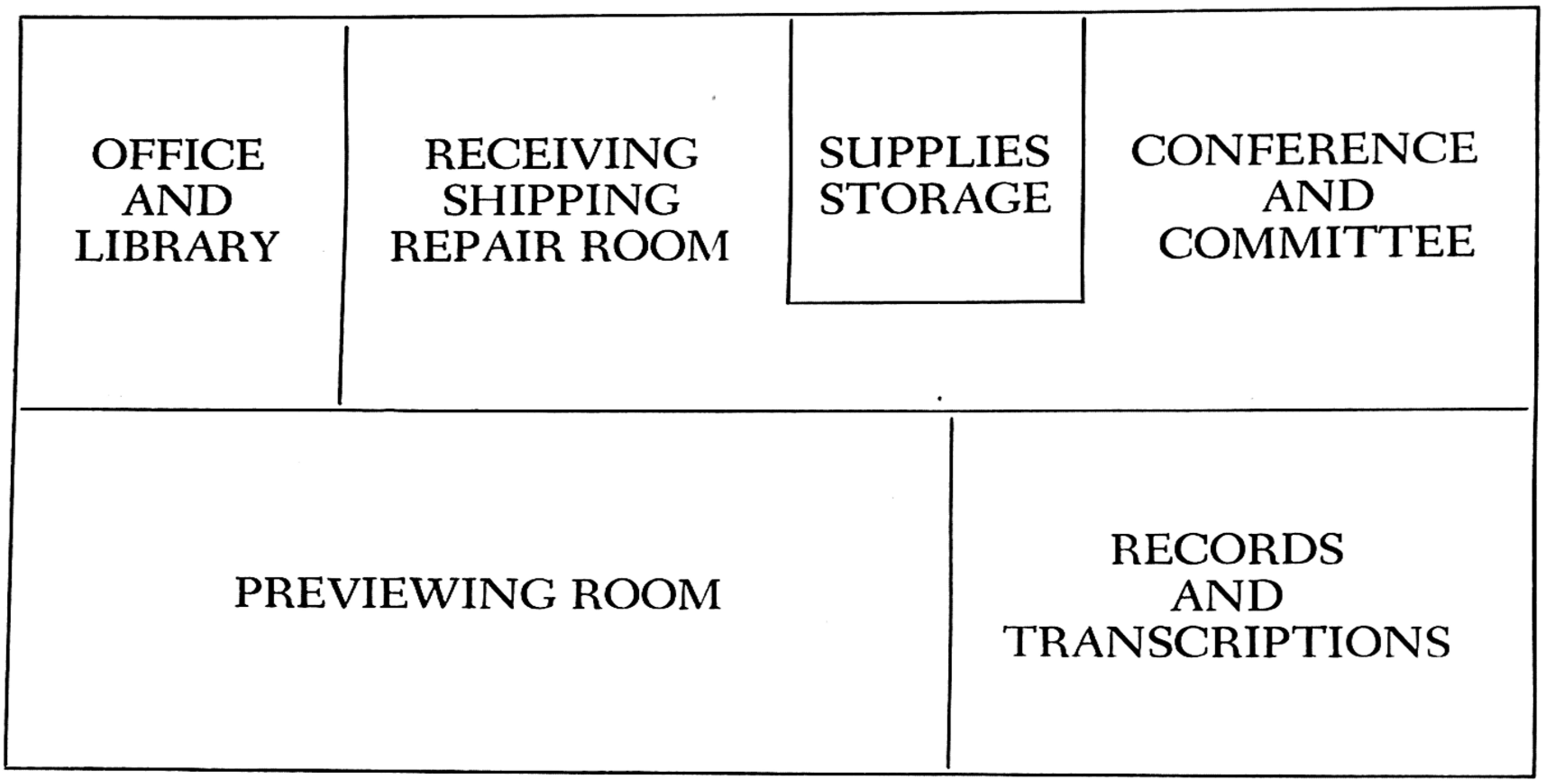
Each building should have floor space assigned to the audio-visual work. If the principal acts as director of audio-visual aids for the building, the arrangements will be somewhat different from those in which there



Proper storage facilitates selection of the appropriate slides.

COURTESY OF STATE UNIVERSITY OF IOWA

is a separate director of a-v materials. Here is a suggested floor plan with functions to be served.



A Suggested Room Arrangement and Minimum Requirements for the Audio-Visual Center in Individual Buildings; Approximately 800 Square Feet of Floor Space

BUDGETS AND FINANCES

Just as it is necessary to plan for the proper administration of a-v materials, it is equally necessary to plan for financing the program. All materials of sufficient educational value to merit use should be considered legitimate expenditures. No audio-visual program can become a dynamic and integral part of the school's educational program unless budgetary provision is made for it. Teachers cannot be expected to provide films, records, or maps from their own resources, nor will catch-as-catch-can financing accomplish more than a flutter. Visual supplies and equipment cost money and must be set up in the school budget along with such items as lathes, books, globes, and balances.

The superintendent of schools or the director of audio-visual education should carefully estimate his audio-visual needs in terms of acceptable concepts of education, and within the ability of the school district to provide funds. If the administration is convinced of the value of the program, there is usually a way to finance it. Timid people usually get timid results. There is evidence on every hand that the proverb "penny wise and pound

foolish," applies to many school practices. Superintendents have been known to purchase one motion-picture projector for a building of fifty classrooms when it is evident that a single projector cannot serve anything like that number. In some cases, one projector is even expected to take turns between two or more buildings. Under such conditions, teachers become discouraged, and what equipment is owned is not used, or a handful of energetic teachers monopolize it completely. One school superintendent has very pointedly stated that "Those who make decisions with reference to allocation of school budget items must begin now to think in terms of two, three, or four times as much money for this work as they have had in the past."[4]

The Committee on Visual Aids in Education of the American Council on Education has taken a positive position in the matter of adequate financial support for the visual program. The report of the Committee says:

> What he [director of visual education] should demand is a definite annual appropriation. This appropriation should represent a fair share of the school tax dollar in terms of the contributions of the visual program to the total educational program. Requests for such appropriations should be made in connection with the presentation of a long-term plan so that the annual appropriation will not be viewed as a discrete item, but will be viewed as an integral part of a continuing financial responsibility.[5]

A survey of audio-visual aids in Wisconsin,[6] based upon a questionnaire study, revealed that 54.11 per cent of the schools paid for their programs through regular budgetary procedures, and the remainder relied upon such sources as petty cash, PTA's, class donations, student collections, sale of scrap, entertainments, and student organizations.

The magazine *Film World*[7] sent a questionnaire to schoolmen over the nation (no mention is made of the number of questionnaires sent out nor of the number of replies received) and reported that 64 per cent of the schools which replied planned to increase their budgets for audio-visual education. Six per cent reported that their budgets were to be

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[4] Rogers, Virgil M., "Organizing and Administering the Audio-Visual Aids Program," *School Equipment News*, p. 4, September, 1944. (*School Equipment News* is published by *The School Executive*, 470 Fourth Avenue, New York.)

[5] Seaton, Helen Hardt, *op. cit.*, p. 25.

[6] Lins, L. Joseph, "Survey of Audio-Visual Aids Used in Wisconsin Schools," *See and Hear*, 1: 53–58, September, 1945.

[7] *Film World*, 1: 85, April, 1945.

doubled; average plans were for a one-third increase. This survey merely indicates a growing interest in the field.

Superintendents and directors of visual education must develop effective programs if they expect school boards to support the programs with more than token sums. This calls for both short-term and long-term planning. If a "selling job" is necessary, they must plan a really vital program in one unit of the school system and see that it functions, neither stretching the program too much nor spreading the materials too thin, also they must plan a long-range program. The short-term experiment serves as an auxiliary or a booster of the ultimate plan. If the school board believes in the effectiveness of audio-visual education, the superintendent will be able to embark on a program which will bring its benefits to every teacher and pupil in the system.

How Much Does an A-V Program Cost? Here is a question frequently asked, but one that is difficult to answer. One way to approach the problem is to blueprint an adequate program including materials, salaries of staff, transportation of materials, equipment, space (if this is computed as a cost item), production activities (if any), and technical service.

In reducing costs to a unit basis, schools rely on such bases as cost per pupil, per pupil in average daily attendance, per building unit, per teacher, or a fixed per cent of the total budget. The authors of an earlier text in the field say: "Allocation on the per-pupil basis cannot be defended. Necessary apparatus, essential teaching tools, is the only logical basis."[8] Some educators maintain that the expense of the program varies so much with the grade level of the pupils that a per-pupil cost basis is invalid. Primary teachers will need less expensive materials than intermediate, upper-grade, or secondary-school teachers. Teachers of such special subjects as speech, art, health, and similar subjects may require still more expensive materials, and in greater quantities. Furthermore, there is a certain amount of basic material which must be provided before any program can begin. For a small school this means a high per capita expenditure; for a large one the per capita amounts are smaller.

Some of the cost figures found in the educational literature, in annual reports, and in conversation with audio-visual experts may throw some light on the problem. Costs range from a few cents per pupil in average

[8] Hoban, Charles F., Hoban, Charles F., Jr., and Zisman, Samuel B., *Visualizing the Curriculum*, p. 271, Dryden Press, New York, 1937.

daily attendance to several dollars. It is safe enough to make the generalization that the effectiveness of the audio-visual program varies proportionately to the amount of money spent on it. No expenditures; no program. But, what tangible evidence is there in the educational literature?

Expenditures in Existing Audio-Visual Programs. In 1945, the Educational Film Library Association appointed a national committee to make a survey of existing budget practices as regards audio-visual education. The report included data from the following institutions: fourteen city school systems, two county school systems, one state department of education, four public libraries, and seven colleges and universities. Mr. Frye, reporting for the committee, said:

> One of the most revealing, if not sorry, pictures is seen in the amount of money spent per teacher. Table A shows that the amount spent per teacher varies from $2.00 to $18.75. If we break this down to a per-pupil basis and use the figure of "30" as the average enrollment, we know that then the annual expenditure varies from 6½¢ to 60¢. Those of us who have been confronted by operational budgets which include purchases and maintenance know that 60¢ per pupil is a niggardly allowance.[9]

An illuminating article on school expenditures for visual education is one contributed by Leo B. Hart, Superintendent of Schools, Kern County, California. Mr. Hart says:

> We cornered a group of audio-visual supervisors and directors and asked them what a good audio-visual program might be expected to cost per pupil. After they recovered from their astonishment that an administrator was asking this question, they admitted that they felt that from $1 to $1.50 per pupil should be budgeted for audio-visual materials alone, and that the services of the audio-visual aids center should be such that these materials might be distributed in an efficient manner.[10]

This discussion of the cost of an a-v program in Kern County, California, would not be complete without the following comments of Superintendent Hart:

> Since we know only too well in Kern County that we are not providing too much in the way of an audio-visual program, we cannot subscribe to any school of thought which maintains that satisfactory audio-visual services can be furnished for much less than $3 per A. D. A. In fact, we are in-

[9] Frye, Lester C., "Report of Committee on Financing An Audio-Visual Aids Program," *See and Hear*, 1: 30–31, January, 1946.

[10] "Workable Visual Program Vital in Selling School Board," *Film World*, 1: 243, August, 1945.

clined to state that $3 per A. D. A. should be accepted as a minimum cost of an audio-visual program which will give teachers what they need in the way of audio-visual materials when they need them. And this figure does not include the cost of equipping individual schools with all of the audio-visual equipment needed to insure good use of materials.

In making this recommendation we wish to emphasize something that has been true in our experience. It is most difficult to begin an audio-visual program in a limited manner. Until a sufficient quantity of good materials can be secured easily by teachers, when they need them, they will not use audio-visual aids effectively in their teaching. It can be said that in the case of the audio-visual program a quantitative increase in available materials brings a greatly increased qualitative advance in the use of the materials.[11]

In the same article, a table detailing the expenditures for Kern County adds significantly to an understanding of costs.

Table VI. Cost of Kern County Audio-Visual Program for 1944–1945

Cost of audio-visual materials added to library (This sum was contributed by school districts in a co-operative audio-visual library program. Participating schools contributed at the rate of 80¢ per A. D. A.)	$ 5,600.00
Budget for new equipment	4,000.00
Operation of audio-visual and instructional materials center (This figure includes salaries of director of audio-visual education, librarians, and technical assistants, five full-time and three part-time workers. Also included is the cost of office supplies, maintenance supplies, photographic supplies, and transportation costs)	24,900.00
Total Costs (Since the combined A. D. A. of all county schools that are this year receiving full use of the co-operative audio-visual library is approximately 10,408 we are spending $3.31 per A. D. A. for audio-visual services. Of this amount 80 cents is being spent to place the materials in the hands of the teachers in an effective manner.)	$34,500.00

The magazine *See and Hear* has gathered a considerable amount of data on current audio-visual budgets. Representative schools, from various geographical areas and of varying sizes, report the following expenditures per pupil for the 1950 school year.

[11] *Ibid.*, p. 243.

Burbank, California	$2.00	Davenport, Iowa	$2.00
Mendicino County, Cal.	1.10	Lexington, Kentucky	.75
Santa Clara County, Cal.	.15	Dearborn, Michigan	1.51
Pueblo, Colorado	.80	New Castle, Pennsylvania	1.48
Westport, Connecticut	4.31	Oak Ridge, Tennessee	2.82
Freeport, Illinois	3.57	Dallas, Texas	1.00
Glencoe, Illinois	2.00	El Paso, Texas	1.31
Gary, Indiana	1.50	Tacoma, Washington	1.70
Sullivan, Indiana	2.82	Green Bay, Wisconsin	2.17[12]

The budgets for audio-visual education for the eighteen cities above should be studied carefully. They range from $0.15 to $4.31 with a mean expenditure of $1.83 per pupil. The range for these same cities ten years ago was from no expenditures to $1.00 with a mean of $0.57. Although substantial progress has been made, the mean of these cities is still much below the minimum suggested by Miss Helen H. Seaton, Executive Secretary of the Committee on Visual Aids of the American Council on Education. Miss Seaton states, "One per cent of the annual per-pupil cost is suggested as a minumum operating figure for the audio-visual program.[13]

The plan suggested by Miss Seaton would work out somewhat in this fashion for a hypothetical case. A school budget of $18,000,000 for a school system of 75,000 pupils would show a per pupil cost of $240. The 1 per cent criterion would then yield an audio-visual budget of $2.40 per pupil, which is in line with the better budget situations reported by the cities above.

At a national meeting of the Department of Audio-Visual Instruction of the National Education Association held in Atlantic City, New Jersey, February 26 to March 2, 1950, a panel discussion of a-v budgets by directors of a-v education and school superintendents brought out the fact that a *minimum* a-v program would cost about $50 per teacher, and a *good* program about $150 per teacher. One member of the panel expressed the hope that the time was not too far distant when there would be a budget of $1000 per teacher per annum for instructional materials, with about $250 of this sum allocated for a-v materials. It is interesting to compare these figures with the findings of Frye in 1945.

[12]*See and Hear*, 5: 28–29, January, 1950. This magazine maintains a continuing survey of budget appropriations for a-v education. Consult succeeding issues of the magazine for additional budget data.

[13]Seaton, Helen Hardt, *op. cit.*, p. 40.

IN-SERVICE TEACHER EDUCATION

In-service opportunities for continuing professional growth are a necessity. Although teachers have undergone a period of pre-service education before formally entering upon their duties, this training can vary considerably in amount and quality. Also, while some teachers have studied recently, others had their courses years ago. Techniques and materials shift and new materials are introduced. Even the objectives of education shift; new values and emphases are given recognition. Therefore, it behooves every school administrator to do everything in his power to keep his teachers abreast of the sociological and professional changes.

Although stimulating and encouraging teachers to keep growing is essentially a responsibility of the local school administration, this responsibility is shared by the state and by the teacher education institutions. The contributions which the two latter agencies can make are rather formal, yet they are important. The state may decree that certain courses or evidences of growth be presented by the teacher periodically as a condition for continuing in the profession. The responsibilities of teacher education institutions lie in providing courses, workshops, institutes, and other opportunities for teachers who are already in service. These opportunities are plentiful. Nearly all teacher education institutions offer summer courses, evening courses, late afternoon courses, or extension courses.

Yet, all these things are not enough, because so frequently they are formal and are wrapped with the red tape of credits, grades, tuitions, and degrees. An inherent desire for growth and development on the part of the teacher is often lacking. It is, therefore, at this point, that the local school administration must take the lead in providing opportunities for growth, and creating a desire to grow.

Wherever possible, co-operation between the school and the teacher education institution is most desirable. But an expanding program of audio-visual education imposes upon the local administration the responsibility of doing more than merely co-operating with the teacher education institutions. The superintendent of schools through the director of audio-visual education must organize specific services for the teachers of his school system so that they can and will make intelligent use of audio-visual materials. Here in brief are some of the suggested in-service teacher education services:

1. The director of audio-visual education or some other qualified person or persons may teach courses in the use of these materials. In some instances these courses can be integrated with the offerings of a local college or university and credit can be allowed.

2. Short courses of one or two weeks for intensive work may be arranged. These courses might be organized as workshops or clinics.

3. Institutes and demonstrations may be held.

4. Specific demonstration lessons given in various buildings during regular school hours with regularly scheduled classes are more helpful than generalized demonstrations. A demonstration lesson in arithmetic will mean most to arithmetic teachers, although teachers of other subjects may get something from it. The point is that demonstration lessons which approximate as closely as possible the situations that particular teachers face are most beneficial. This principle provides almost endless opportunities for training.

5. Individual conferences between teachers and the director at both the audio-visual center and in the school develop interest and understanding.

6. Production of study guides and other printed "helps" which will bring to teachers specific suggestions for the use of audio-visual materials is also valuable.

7. Encouragement of researches on the values and uses of audio-visual materials is essential. Also, the summarization and annotation of researches, articles, books, and pamphlets, and the distribution of these compilations in the form of "service bulletins," newsletters, and reports to the school personnel, are highly recommended.

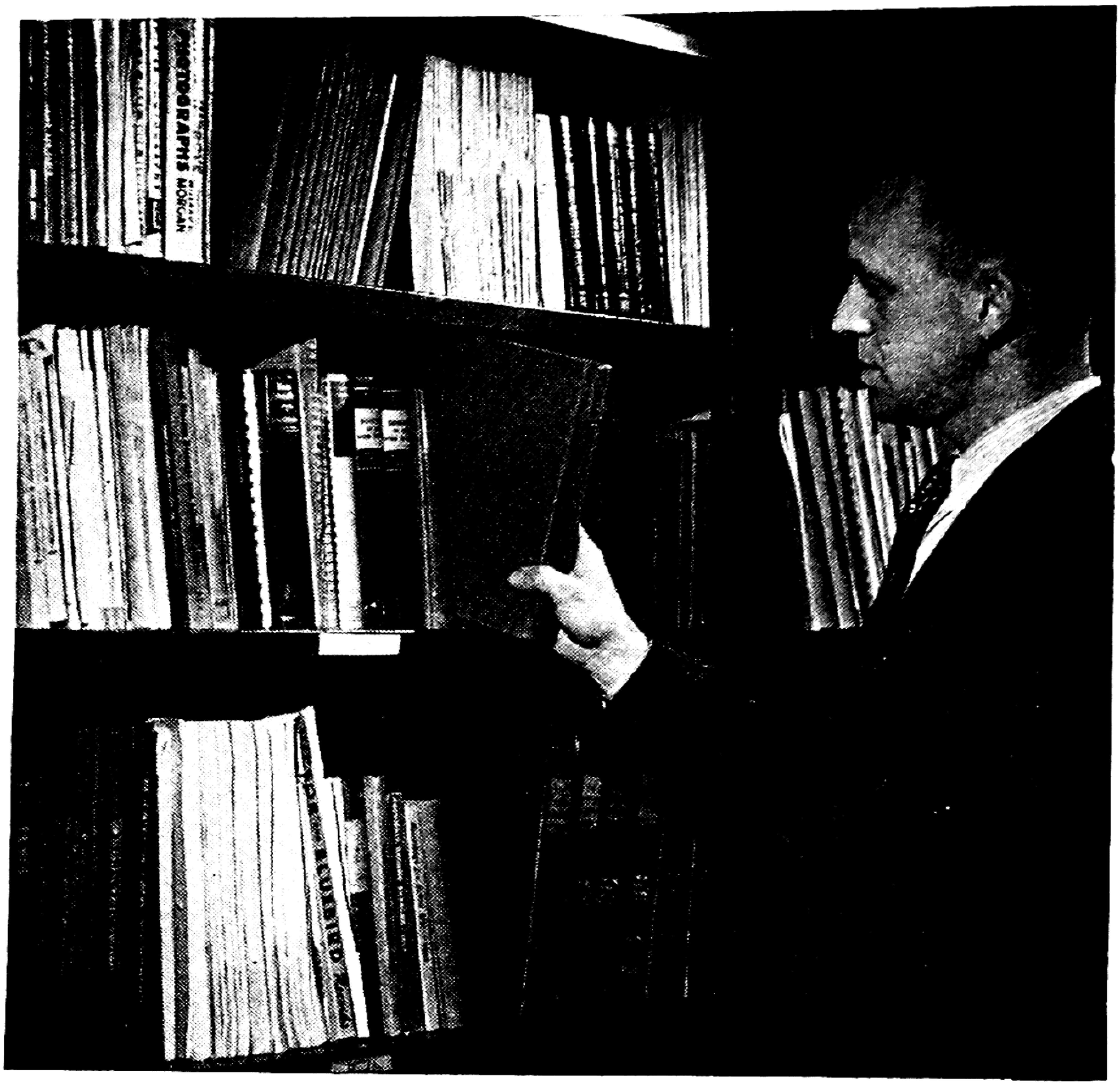
8. Arranging for individual instruction in the operation of equipment by building directors or by personnel from the central office is a necessity.

9. Regularly scheduled screening or preview sessions to which teachers may go to keep abreast of what is new in films, filmstrips, records, and transcriptions are common practice. These screening groups may be the final authority in recommending the materials which the district should purchase. This ensures the purchase of materials which teachers find most useful.

10. Discussions, reports, and talks organized as programs for faculty meetings are other aspects of the training program. Supervisors and interested teachers can give firsthand accounts of what they are doing with audio-visual materials.

A library of textbooks, pamphlets, and researches is indispensable.

COURTESY OF STATE UNIVERSITY OF IOWA



11. Interschool and intraschool visits provide opportunities for teachers to see how other teachers are using materials in their classroom work.

12. Another source of in-service training is opened up through the local production of audio-visual teaching materials. Learning by doing generates enthusiasm. Production may be limited to the preparation, binding, and cataloging of slides, the mounting of flat pictures, building models, collecting and arranging exhibits, or the program may develop to the point where motion picture films are planned, photographed, edited, and utilized. Such a project may involve a great many teachers in a cooperative effort. By working with projects of this type, teachers gain an intimate understanding of the possibilities of the various materials.

In-service education of teachers has its counterpart in the trainee programs of business and industry, and it was a very important aspect of the audio-visual program of the Armed Services during the war. Both the Army and Navy recognize training as a never-ending process. A multitude of training aids was always available, and naval officers, for example, were constantly learning from the time they entered service until they were mustered out. A naval officer's training started before he was commissioned. After the ship's officer personnel was selected, specific training was inaugurated. This training was continued after the ship was com-

missioned. In like manner, the trainee programs of business and industry are recognized as indispensable. This is the only way that personnel can keep abreast of a fast-moving world. Planned training programs with training equipment are held in special training laboratories. Participation of the personnel in these programs is compulsory.

Many school systems are currently sponsoring effective in-service education programs along the lines outlined above. In some cases the program is compulsory, but in most cases it is voluntary. The one in Portland, Oregon, has been well organized and is doing an effective job. It is offered as a continuous refresher training course to keep teachers thoroughly abreast of the developments in a-v education. The director of the course says:

> The Portland in-service training course comprises 12 two-hour sessions, one each week. It is offered twice a year and has been well attended. [Last year Portland gave 26 such courses and 658 teachers attended.] Apparently, the teachers are interested in this teaching technique and are willing to spend extra time in mastering it. The two hours are divided into a sixty-minute period on materials and utilization, a ten-minute intermission, and a fifty-minute laboratory period. In the latter period assistance from the departments' technicians has been necessary, as forty pupils [teachers] are far too many for one instructor in an audio-visual aids laboratory.[14]

The organization of workshops and clinics has been found to be more functional than most formally organized classes. Actual teacher needs seem to be given more consideration.

Audio-visual classes, workshops, or clinics must be "audio-visual" in method as well as name. Reading books, memorizing nomenclature, and writing lesson plans are inadequate. Teachers must learn firsthand—by doing. This applies to learning to operate machines, producing materials, collecting and evaluating materials, and to formulating objectives.

Workshop groups should be small so that teachers can get firsthand experiences. There should be an ample array of equipment and supplies. The work should not be wedged in between fifty-minute bells. A leisurely laboratory procedure of reading, observing, doing, and evaluating will get better results. During the course of the workshop, teachers should see demonstration lessons which use audio-visual curriculum materials. Teachers should be encouraged to tell why they are taking the course or

[14] Trenholme, Kingsley, "In-Service Training in Audio-Visual Aids," *See and Hear*, 1: 33–39, March, 1946.

workshop, and what questions they would like to have answered. Such a procedure will help give the workshop real value.

In 1946, an audio-visual committee at the Western Illinois State Teachers College conducted a survey of 647 schools and school systems. One question asked teachers what kind of a course or procedure they favored for preparation in the utilization of audio-visual materials. The results were: 128 favored formal courses in colleges or universities; 239, extension courses conducted by colleges or universities; and 504, the short, informal, noncredit course of the workshop type.[15]

CURRICULUM DEVELOPMENT

A noticeable trend in the organization and administration of a program of audio-visual aids is found in the manner in which modern schools are co-ordinating these materials with curriculum revision and unit construction. Materials of any type whatsoever cannot be divorced from the total educational process, if they are going to accomplish maximum results. The Director of Curriculum Research and Construction and the Director of Audio-Visual Education must work together.

It has been recognized for years that courses of study, instructional units, and textbooks should provide teachers with bibliographies of related materials. This enrichment must be extended to include the rich assortments of audio-visual materials which are now available. As these materials are integrated with the other learning materials and activities, they must be tested and classified as to the most appropriate maturity levels and their total effect upon the learning process. Furthermore, teachers must be given voice in this selection and arrangement of the curriculum materials, or the result will be one which has been too familiar in American schools, the "administrator conceived" program which is handed to the teacher.

PUBLIC RELATIONS AND AUDIO–VISUAL EDUCATION

One of the duties of every supervisor of audio-visual education is to assist the school administrator in educating the community to the values of his department. A community which supports the program enthusias-

[15]*The Function of an Audio-Visual Department in a Teacher Education Institution.* Macomb, Ill.: Western Illinois State Teachers College, Bulletin, Vol. 26, No. 4, Dec., 1946.

tically and willingly, provides the necessary budget for that program. Individual teachers cannot but feel the community interest, and as they do, morale all along the line will be lifted.

The public-relations activities of the director of audio-visual education can have great variety and breadth. Opportunities for him to work with community groups are numerous. He will be expected to speak to and work with such groups as PTA's, service clubs, churches, hospitals, women's clubs, and others of like nature. During the war years, the director of audio-visual education served a very important function as liaison between the schools and government agencies. The schools very generally made their projectors available for the showing of films dealing with war bonds, morale, conservation, salvage, blood donations, and pay-roll savings. During the war years many school projectors were used as much, or more, for community purposes as for school purposes. Schools gained a great amount of good will, and many adults saw for the first time what a projector can accomplish. A reasonable query for any person in thinking about the projector at a public showing is, "Wouldn't this be a good thing to use at school?"

Many cities have found so many calls being made upon the time and



Audio-visual aids create community good will toward the schools.

COURTESY OF ST. LOUIS PUBLIC SCHOOLS

resources of the department of audio-visual education that they have had to adopt regulations governing the conditions under which operators, projectors, or films will be made available for nonschool activities.

Any school that develops an effective a-v program will have no trouble in getting and holding public support for it. First, the children are the best emissaries. They carry the "word" home about what they are doing at school, and the parents see tangible results in the interest of their children. Second, school officials should hold demonstrations and conferences from time to time in the several buildings to show the parents what they do with motion pictures, slides, filmstrips, records, models, and other materials. Third, these materials should be in evidence on such occasions as "open house," "parents' night," or evening school. Fourth, articles in the local newspapers, service bulletins, and other journalistic media will help keep the parents informed. Fifth, the director of audio-visual aids, the superintendent, and principals should "take to the air" and explain their program. Sixth, every opportunity should be captured to show the public the materials. It is possible, for example, to tie films and records in with many school entertainments, either before or after performances, between halves, or between acts. Naturally, care must be exercised not to convey the idea that these media are just sources of entertainment. The fact must be made clear that these are instructional materials.

It cannot be too strongly urged that those individuals who are trying to promote better public relations for their schools in general and for audio-visual aids in particular should "talk" to the people of the community about visual aids "through visual aids." Arthur Stenius, formerly director of audio-visual aids for the Detroit Public Schools, has shown conclusively the value of charts as a visual aid in presenting the school budget, and the needs of the department of audio-visual education.[16] The lecture-demonstration and the outright demonstration lesson are peerless for presenting the values of audio-visual aids. Many schools have found that building a film or two of their own results in better understanding between the schools and the public. The film is a public-relations project of prime value. Such a film may include a variety of school activities such as actual classroom work, or it may take some particular project and develop it in more detail. Community interest is

[16] Stenius, Arthur, "Visualizing Visual Needs," *See and Hear*, 2: 26–27, December, 1946.

likely to be high in such a film. It may be given an advertised premier showing in one of the school auditoriums, with subsequent showings in other buildings. The film will be in demand for showings by such groups as service clubs, PTA's, chamber of commerce, police, city planning boards, and others. These are not exaggerated claims; they have been borne out by the experience of many schools.

STATE PROGRAMS

Aside from a rather brief mention in Chapter 2 of state efforts in stimulating the use of audio-visual aids, this volume has discussed the use of these aids from the standpoint of individual classrooms and school districts. Rightly, it is believed, emphasis has been placed on what the audio-visuals are, what values they have, and how they can be utilized to best advantage in the classroom. But, no volume on modern audio-visual education would be complete without some mention of the part which state departments of education can play and are playing in certain states. Appropriately enough, this discussion of state programs has been reserved for inclusion in this chapter on administration.

Ohio was one of the first states to recognize the value of visual education when it set up a Slide and Film Exchange in the State Department of Education about 1926. From this date until the present, the State of Ohio has distributed films and slides to the schools of the state entirely on a free-rental basis. In recent years filmstrips have been added to the service of the Exchange.

Pennsylvania, likewise, pioneered in the field. Persons trained in sensory aids and techniques were maintained on the staff of the State Department of Public Instruction. In the early thirties a series of monographs dealing with a variety of visual aids was published. The Pennsylvania interest culminated in a state regulation in 1935 to the effect that every applicant for a permanent teaching certificate must present evidence of having successfully completed a course in audio-visual aids.

As early as 1904 New York organized a Visual Instruction Division in the State Education Department. This was reorganized in 1949 as the Bureau of Audio-Visual Aids. The Bureau has no separate budget.

Although it is not possible in a volume of this kind to describe the activities of all states, brief mention will be made of a few outstanding ones. A reorganization of the State Department of Education in Cali-

fornia in 1944 and 1945 made provision for a Bureau of Audio-Visual Education with a separate budget. The state now requires all new teachers to take at least two semester hours of a-v education in preparation for a general teaching credential. Texas has developed a fully co-ordinated audio-visual program, a small lending library, and a school of the air functioning under a single director. Other states which have made definite provision for bureaus of a-v aids with separate budgets are Arkansas, Connecticut, Montana, Oklahoma, Rhode Island, and Virginia. As nearly as can be ascertained, twenty-one states now have state officers who provide a-v leadership at the state level.

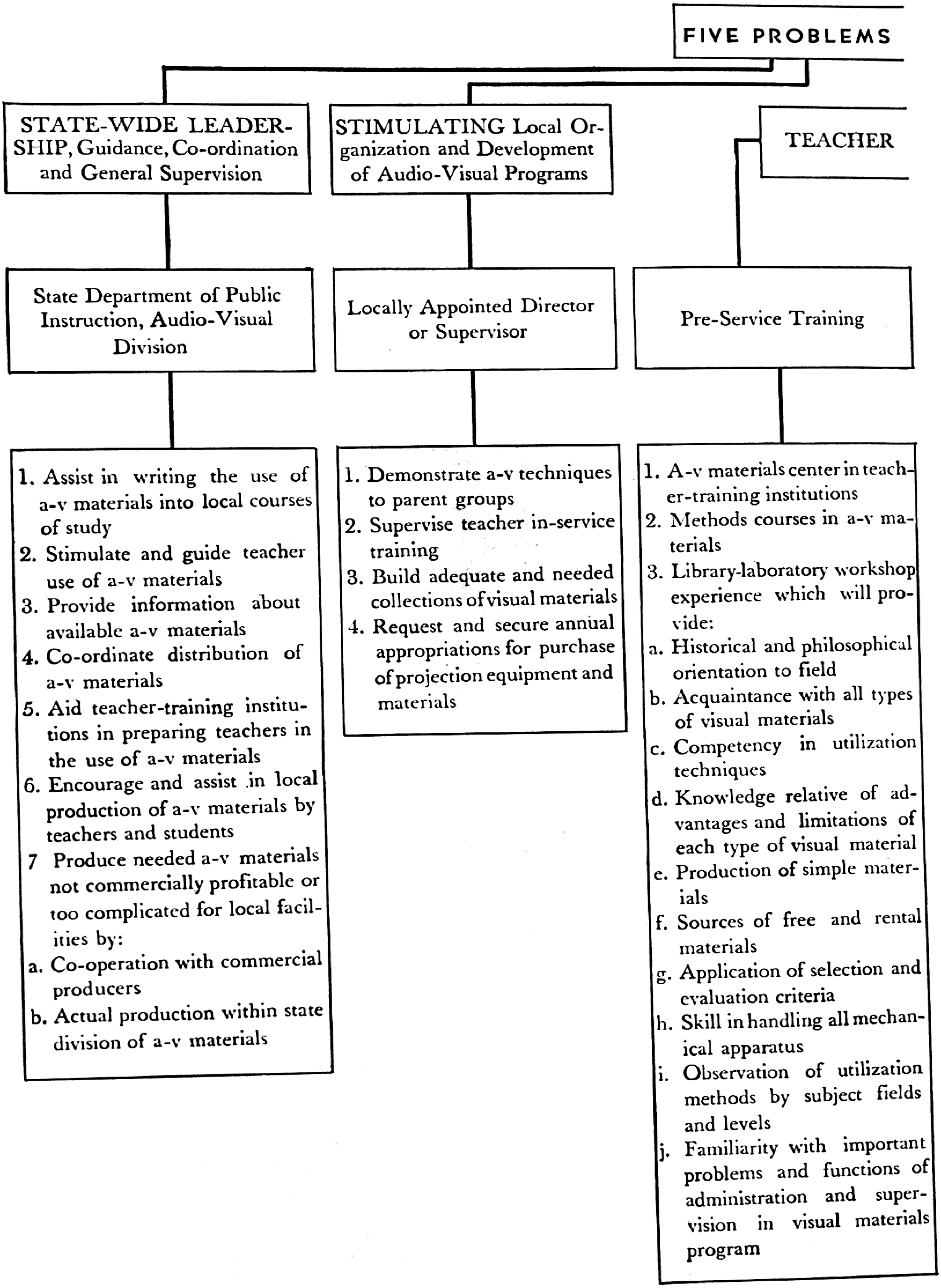
In Michigan, an Audio-Visual Committee consisting of eight of the

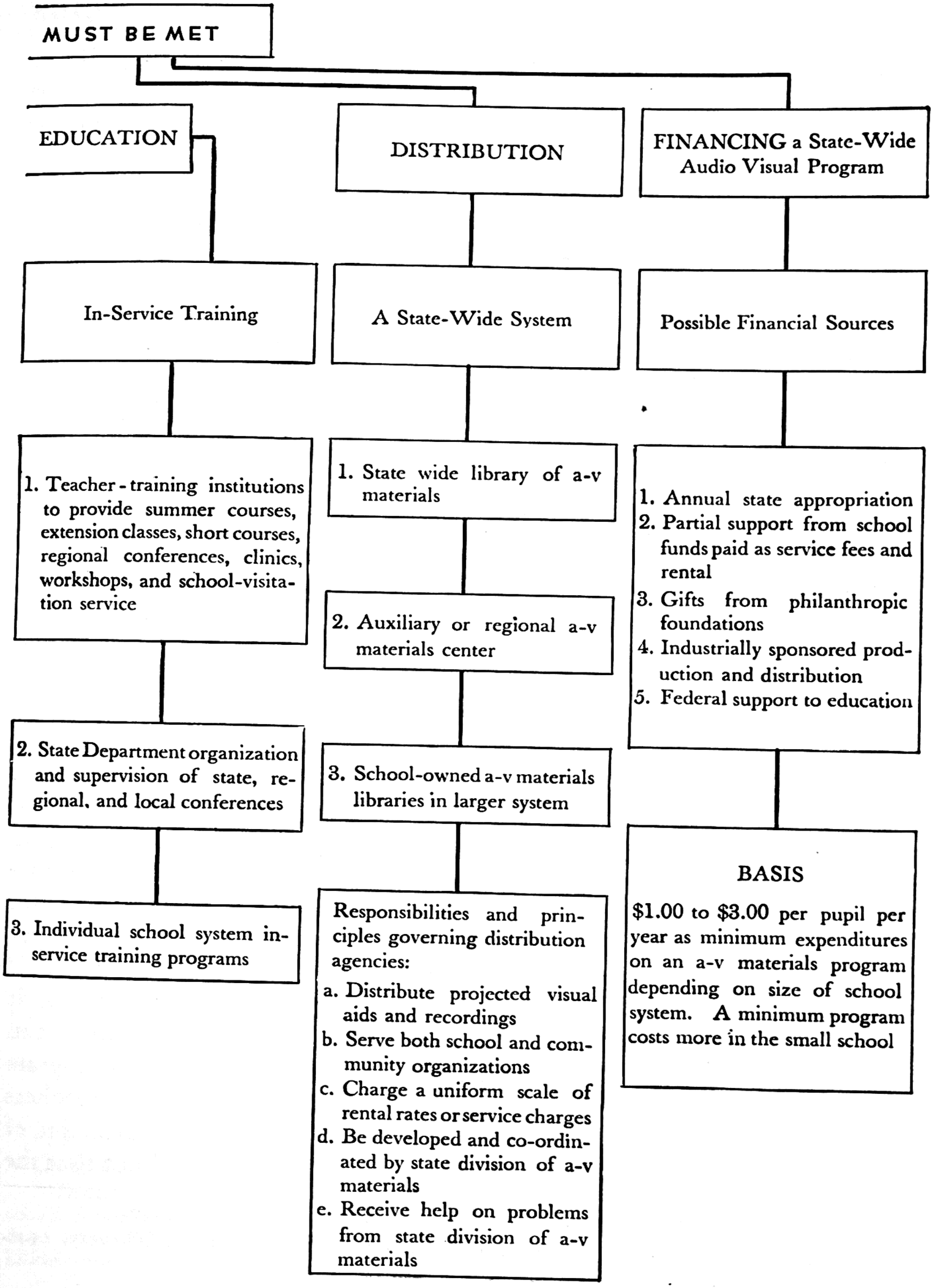


Films which deal with teaching problems and pupil maladjustments are useful in pre-service and in-service programs. The student in the top picture lacks the poise of the student shown below.



THESE TWO SCENES ARE FROM *Learning to Understand Children.* TEXT-FILM IN TEACHER EDUCATION SERIES (SCHORLING), MCGRAW-HILL BOOK COMPANY, COPYRIGHT, 1947


FIVE PROBLEMS
STATE-WIDE LEADERSHIP, Guidance, Co-ordination and General Supervision
State Department of Public Instruction, Audio-Visual Division
1. Assist in writing the use of a-v materials into local courses of study
2. Stimulate and guide teacher use of a-v materials
3. Provide information about available a-v materials
4. Co-ordinate distribution of a-v materials
5. Aid teacher-training institutions in preparing teachers in the use of a-v materials
6. Encourage and assist in local production of a-v materials by teachers and students
7 Produce needed a-v materials not commercially profitable or too complicated for local facilities by:
a. Co-operation with commercial producers
b. Actual production within state division of a-v materials
STIMULATING Local Organization and Development of Audio-Visual Programs
Locally Appointed Director or Supervisor
1. Demonstrate a-v techniques to parent groups
2. Supervise teacher in-service training
3. Build adequate and needed collections of visual materials
4. Request and secure annual appropriations for purchase of projection equipment and materials
TEACHER
Pre-Service Training
1. A-v materials center in teacher-training institutions
2. Methods courses in a-v materials
3. Library-laboratory workshop experience which will provide:
a. Historical and philosophical orientation to field
b. Acquaintance with all types of visual materials
c. Competency in utilization techniques
d. Knowledge relative of advantages and limitations of each type of visual material
e. Production of simple materials
f. Sources of free and rental materials
g. Application of selection and evaluation criteria
h. Skill in handling all mechanical apparatus
i. Observation of utilization methods by subject fields and levels
j. Familiarity with important problems and functions of administration and supervision in visual materials program


MUST BE MET
EDUCATION
DISTRIBUTION
FINANCING a State-Wide Audio Visual Program
In-Service Training
A State-Wide System
Possible Financial Sources
1. Teacher-training institutions to provide summer courses, extension classes, short courses, regional conferences, clinics, workshops, and school-visitation service
1. State wide library of a-v materials
1. Annual state appropriation
2. Partial support from school funds paid as service fees and rental
3. Gifts from philanthropic foundations
4. Industrially sponsored production and distribution
5. Federal support to education
2. Auxiliary or regional a-v materials center
2. State Department organization and supervision of state, regional, and local conferences
3. School-owned a-v materials libraries in larger system
BASIS
$1.00 to $3.00 per pupil per year as minimum expenditures on an a-v materials program depending on size of school system. A minimum program costs more in the small school
3. Individual school system in-service training programs
Responsibilities and principles governing distribution agencies:
a. Distribute projected visual aids and recordings
b. Serve both school and community organizations
c. Charge a uniform scale of rental rates or service charges
d. Be developed and co-ordinated by state division of a-v materials
e. Receive help on problems from state division of a-v materials

state's leading audio-visual educators made an exhaustive study of the problems faced in the state and prepared a lengthy and detailed report of findings and recommendations. This Committee attempted to outline a completely integrated state program to be met by legislative appropriations. The magazine *See and Hear* worked out the accompanying graphical analysis of the report.[17] Note the emphasis on training and distribution. The recommendation of $1.00 to $3.00 per pupil per year as minimum expenditures should not be overlooked. See page 569 for further ideas about financing the plan.

COUNTY PROGRAMS

Without waiting for the development of state-wide programs to take shape, many county school systems have set up well-organized audio-visual programs. Some educators maintain that such an administrative unit is more efficient than a state unit because it is compact and provides for a more effective utilization of materials. It is also more efficient for small schools to pool their resources than to try to purchase or rent their materials individually. Kern County, California, has a functioning program that may serve as a pattern for county organization. A committee studied the problems of a county a-v program before the Kern County project was launched. The committee concluded that a county unit is highly desirable if it has an average daily attendance of twelve thousand or more, and if the schools to be served do not reach beyond a radius of sixty to seventy miles from the a-v center. "In general the audio-visual center should be able to give schools overnight service."[18] The figure set by the Kern County Committee exceeds that proposed by the Audio-Visual Committee of the American Council on Education. The latter recommends the establishment of county units with a full-time director in counties having a general population of twenty-five thousand or more.[19]

In many respects the Kern County unit is a model organization. It maintains a library large enough that the teachers of the county can easily get the materials they need when they need them. The program includes an adequate staff, provisions for in-service training of teachers in the proper use of materials, teacher assistance in the evaluation of materials, and a reasonable budget. Elsewhere it was pointed out that the

[17] Issue of November, 1946, pp. 26–28. See also 2: 25–28, October, 1947.
[18] McPherson, James, "Patterns for Tomorrow," *See and Hear*, 1: 78, February, 1946.
[19] Seaton, Helen Hardt, *op. cit.*, p. 33.

State Legislative Appropriation on a per-pupil-per-year index of $1.50*—1 million pupil population yielding 1½ million dollars

1. Establishing and maintaining audio-visual centers in teacher-training institutions 15%

2. Purchasing audio-visual materials, subsidizing and building the central state distribution system 35%

3. Financing activity of state division of audio-visual materials 10%

4. Reallocation to local or county schools on a per-pupil per-year basis for personnel**, materials or equipment 40%

FINANCING THE MICHIGAN STATE PROGRAM

*The $1.50 per child is more or less for purposes of illustration only. Additional study might well show that $1.25 or $1.75 per child would be a more justifiable amount.

**Concerns only personnel assigned to the direction of the audio-visual program. A school system might apply such money to the salary of a full-time audio-visual director, or to a part of a person's salary, if the individual carries audio-visual direction responsibilities only as a part-time assignment.

cost of the program for Kern County is $3.31 per pupil in average daily attendance. Individual school districts are responsible for the purchase of all audio-visual materials and equipment permanently placed in the schools, and the central library and its service are maintained by funds appropriated by the districts served.

THE HORIZON

In audio-visual education as in so many other areas of human experience, things which once seemed impossible eventually become a reality. From a few simple sensory models and tools, audio-visual methods and materials have developed into a complex and expansive field, yet no one believes that this expanding aspect of education has approached the crest of its development. Its growth has been slow but consistent and regular, and contemporary events appear to have accelerated this growth. Audio-visual education is not without its critics. Dire predictions have been made from time to time concerning what will happen if this method continues to grow. Some have feared that teachers will no longer be needed, and others that children educated under a system involving the use of a-v methods will be sensory simpletons. Interestingly enough, the opposite seems to be true in each case. Students show evidence of better reasoning because they are more successfully challenged, and because they have a clearer understanding of the things they are thinking about. Audio-visualists face the future confident that they can assist materially in the education of modern youth, and they may well borrow a phrase from Maeterlinck:

The future is a world limited by ourselves; . . . .

QUESTIONS AND TOPICS FOR DISCUSSION AND REPORT

1. Make a study of the county in which you live to ascertain the feasibility of establishing a county audio-visual department. Include in the study such items as the following:
   - (a) Size of county in square miles and distance from the county seat to the most remote point in the county
   - (b) An outline map of the county with school districts indicated
   - (c) Total population and A. D. A. figures
   - (d) Size of library needed to serve the county
   - (e) Size of staff needed
   - (f) Estimated costs
2. Report on the status of audio-visual education in your state from the

standpoint of the state department of education. Include such items as philosophy, leadership, funds, and organization.

3. Study your own district. What funds are now spent on audio-visual materials? How much is this, computed on a per-pupil or a per-teacher basis? What percentage is it of the total budget? Compare the sums spent on textbooks with those spent on a-v materials.
4. Consider the administration of the a-v program in each school building. Outline the duties of the one in charge. What percentage of his time might equitably be allowed for administering the a-v program? If possible, make a survey of twenty or thirty school districts to see how this matter is handled.
5. Make a study of equipment costs for (a) an elementary school building with an enrollment of 250, (b) a high school with an enrollment of 1200.
6. Prepare a comprehensive evaluation of the program in your own school (in-service teachers). Consider such items as personnel, budget, equipment, supplies, public relations, integration of program with curriculum, and service to teachers—catalogs, bulletins, training aids, delivery of materials, etc.
7. Summarize the advantages and disadvantages of owning and renting films. What principles can be drawn?
8. Discuss the implications involved in taking the a-v operational expenses out of the "activities fund."
9. Prepare lists of 25, 100, and 300 basic film titles for a school-owned library of films. Keep a list of the cost of these basic films. After the basic library has been acquired, how many films should be added each year?
10. Arrive at some basis for estimating how much time and money a school district might reasonably spend on the production of the simpler a-v materials.
11. Comment on the suggested floor plan for the audio-visual center. What changes would you wish to make?
12. Prepare a set of principles for organizing and administering an audio-visual library in your school system.
13. Discuss the advantages of integrating all curriculum materials for the general enrichment of the pupils.

LABORATORY EXERCISES

1. A trip should be planned to a city school which maintains a well-organized and financed department of audio-visual materials. Evaluate all aspects of the program.
2. Prepare a script for a film based upon data and principles set forth in this chapter. (a) How valuable would such a film be? (b) How long should it be? (c) Estimate its cost. (d) How and by whom would such a film be used? (e) Would this film duplicate the films listed in Exercise 3?
3. There are several motion pictures on the market which deal with the problems of utilizing films in the classroom. Analyze these films. How

valuable will they be to the director of audio-visual education? To classroom teachers? Here are some of the films to consider:

(a) *Using the Classroom Film,* 2 reels, 16-mm., sound. Produced by Encyclopedia Britannica Films, Inc. Rental $5 per day; sale price, $85. This film demonstrates how to use a film in the classroom. Made especially for teacher-education classes, teachers' meetings, conferences, institutes, and workshops; for supervisors and administrators; for film libraries.

(b) *How to Teach with Films,* 2 reels (20 min.), 16-mm., sound. Produced by Cathedral Films, Inc. Rental, $6.00 per day; not generally available for outright purchase. This film was made to help teachers and leaders of religious education use motion pictures more effectively. It is accompanied by a "Teachers' Study Guide." The film, although prepared especially for religious groups, is nondenominational in every respect and will be valuable for lay utilization. One might say that this film is in itself a good course in visual education.

(c) *Using Visual Aids in Training,* 1¼ reels (14 min.), 16-mm., sound. Produced by Castle Films for the U. S. Office of Education, Division of Visual Aids. This film was produced especially as a supervisory training film for use during the war in training new employees. The film is general enough that it may be considered for use with school groups. "An instructor, teaching his class the use of the micrometer, follows a carefully planned procedure involving the use of a visual aids unit: that is, a training motion picture, a co-ordinated film-strip, and an instructor's manual."

(d) *Film Tactics,* 2 reels (22 min.), 16-mm., sound. Produced by Castle Films and used by the Training Aids section of the Navy for improved utilization of training films. It illustrates right and wrong methods of using films and other audio-visual aids for instructional purposes.

(e) *Filmstrips on A-V Administration.* This is a series of five filmstrips produced by Young America Films, 18 East 41st Street, New York 17. The titles in the series are: *The Large-City Audio-Visual Aids Organization* (Newark, New Jersey), *The Small-City Audio-Visual Aids Department* (Dearborn, Michigan), *The College Audio-Visual Center* (State College, Pullman, Washington), and *The County Audio-Visual Service Program* (San Diego County, California).

(f) *The Slidefilm in Teaching.* Produced by Young America Films, Inc. By use of cartoon techniques this filmslide shows the chief educational purposes for which filmslides can be used and suggests good techniques to be followed in making effective use of them. Excellent for teacher-training purposes.

(g) *Tips on Slidefilms.* Produced by Jam Handy Productions. This filmslide is designed to show the correct mechanics of using filmstrips and to illustrate the use of the S. V. E. model AAA filmstrip projector.

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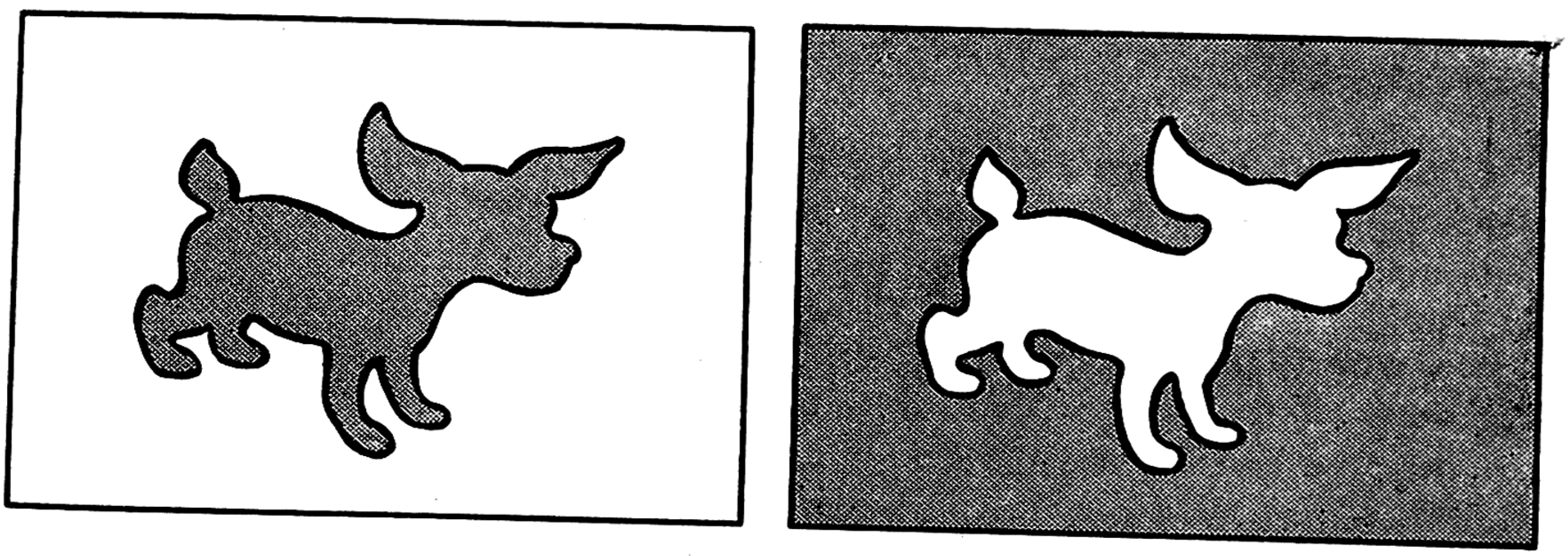
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APPENDIX A DIRECTIONS FOR PREPARING HANDMADE SLIDES

1. Smoked Glass. One of the simplest slides is made by taking a piece of slide glass and holding it over a candle flame until one side is thoroughly smoked. Then with a pencil or sharp stick, designs or writing may be made in the carbon deposit. Such a slide will smear easily, and must be mounted with a cover glass and bound by tape if it is to have any usefulness. Smoked glass slides are messy to work with and are rarely used. Artistic effects resembling pictures from woodcuts can be achieved if time and patience are at the command of the student.

2. Paper Cutouts. Pictures are cut out of lightweight black paper or any other opaque paper. The picture is then mounted between two pieces of plain glass and is ready for projection. The result is a silhouette. A variation in the type of silhouette can be had by using the paper frame from which the picture has just been cut. When projected this gives a clear silhouette framed with a black background. The figures below illustrate the two types.



3. Pencil and Crayon on Etched Glass. Another simple slide can be made by the use of an ordinary lead pencil and etched glass, writing and drawing being applied directly on the etched glass. Water-color pencils may be used for color slides.

Slide crayons (these crayons are not as soft and greasy as ordinary crayons) are easy to work with on etched glass. In making this slide, place the piece of

etched glass over the drawing to be copied (or sketch in freehand) and outline the picture with a lead pencil. Fill in appropriate colors, working the colors up to the pencil outline. Mistakes may be erased with ordinary pencil or ink eraser. These slides are easy to make, are neat and durable. If the slide is to be preserved, it should be mounted. Pictures may be removed from the etched glass at any time by the use of soap and water or washing powder. As soon as the glass dries it may be used again.

4. Colored Ink on Etched Glass. Ink slides are made in much the same way as crayon slides. They are usually made on etched glass but may be made on plain glass. Most people experience difficulty in controlling the flow of ink on plain glass. If plain glass is used it should be thoroughly cleaned, preferably with alcohol or ammonia, to remove any trace of a grease film. The glass must be kept free of finger marks. In using etched glass, the picture should be outlined first with pencil and then inked carefully up to the outline. This outline keeps the ink from spreading on the roughened surface of the slide and keeps edges distinct.

The chief advantage of the colored ink slides is to be found in the brilliant colors. Use a transparent ink. The ink should be kept at the proper consistency for best results. If it is too thin it spreads too rapidly and overruns margins; if too thick, it smears and dries unevenly. In putting on the ink, allow each area to dry before putting on an adjoining area. Colors may be mixed for tints and shades. The mixing should not be attempted on the glass; it should be done in a receptacle. Use a pen or small brush in applying the ink. Work rapidly so as to prevent uneven drying and clotting. Ink slides may be cleaned with ink solvent.

5. Ceramic Lantern Slides. China-marking pencils are ideal for making slides. Children in the primary grades can work with them. Plain or etched glass may be used. Plain glass should be thoroughly cleansed.

6. Coated Lantern Slides. Plain glass will be found to be a better medium if coated on one side with a thin solution of shellac or glue-water. Work can then be put on the glass with pencil or ink with less difficulty. Slides treated in this way can be projected equally as well as untreated plain or etched glass. Emulsion-coated slides glass or plates can be purchased if the teacher does not care to bother with the coating of the glass.

7. India Ink Lantern Slides. Black and white slides can be made with India ink and plain cover glass. The glass should be thoroughly cleansed. Coated glass, described in No. 6 above, makes the work easier. There is a special pen point for this work but a crow quill or any other point will serve.

Slides of this type are ideal for illustrating stories or for outline maps of states or countries.

8. Typed Lantern Slides. Typewritten slides are usually made on cellophane and then mounted between two pieces of plain glass. In preparing typewritten slides, it is well to make a test first on ordinary paper until sufficient skill is gained in estimating placement of material and amount of content which can be put on the slide. Take a piece of paper of slide size, mark off a margin of ⅜ to ½ inch around it. Type the content on it. You will soon observe that thirteen or fourteen lines of print with about thirty-three spaces to the line can be put on a slide. For neat slides do not begin too near the top, type too close to the bottom, nor crowd the sides.

Begin with a sheet of thin cellophane of slide size (amber color is recommended because it permits a maximum of light to pass through and is restful to the eyes). Next cut a sheet of good-grade carbon paper double the size of the lantern slide, fold it once across the short way with the carbon surface inside. Slip the cellophane sheet inside the folded carbon paper. Insert in the typewriter. The sheet of folded carbon, with the cellophane inside, may be fastened at the corners to a sheet of typewriter paper by small gummed tabs. This lends greater support and insures ease in inserting it in the typewriter and lining up the material. Otherwise there may be some trouble caused by the small sheet of carbon slipping in the machine when nearing the bottom. Clearer copy can be had by placing the typewriter in stencil-cutting position. Plan the copy carefully. Begin about one-half inch from the top. After typing, remove the cellophane sheet and discard the carbon. Notice that the carbon imprint has been made on both sides of the cellophane; this is to insure clearer copy. Place the cellophane sheet between cover glass and bind.

Handwritten material, drawings, outlines, tracings, etc., may be imprinted on cellophane in a similar manner by using a stylus or a sharp, hard, lead pencil.

9. Colored Cellophane Slides. Striking effects may be achieved through the use of colored cellophane cut to the color outlines of the design to be portrayed. The general design is first sketched on paper of slide size and a piece of cover glass laid upon it. The colored cellophane is cut to the outline by laying it on the glass and cutting with the corner of a razor blade. To fasten the cellophane to the glass, apply glue with a pin point, the smaller the quantity the better. Shades and variations of color may be made by overlapping the same color or various colors. India ink may be used on the cellophane for lining and shading.

Colored cellophane slides are attractive to look at and fascinating to make. This is an excellent way to fill in large areas in a design such as sky or sea.

Political maps can be built up by using different colors for different states. Stage settings and lighting effects for dramas are also excellently portrayed with colored cellophane. Costumes for characters, dolls, or peoples of various nations can be built up in like manner.

10. Slides with Film or Plastics. Slides may be made by removing the emulsion from exposed cut-film negatives and then drawing the desired pictures directly on the negative. On the whole, this is not a very desirable type of slide because insufficient light passes through the film to give the illumination necessary for satisfactory results.

A new composition, Lumarith, has proved to be highly satisfactory for hand-made lantern slides. It is a cellulose acetate substance which is not affected by the heat of the projector. It can be purchased in sheets of 20 by 50 inches at prices ranging from $0.55 to $1.50 per sheet depending on the weight.[1] It is highly transparent, and slides made from it need not be enclosed in glass.[2]

[1]Celluloid Corporation, 290 Ferry Street, Newark, New Jersey

[2]In addition to the references at the close of Chapter 7, this one is important:

Brooks, Mary Esther, "Lantern Slides and How to Make Them," *See and Hear,* 1:65–73, April, 1946; 1:70–79, May, 1946; 2:48–50, October, 1946; 2:29–31, November, 1946. (This series of articles on the making of slides presents a step-by-step account of just how they are made. The articles also give sources of materials needed for making slides, and an extensive bibliography.)

APPENDIX B USING MOTION PICTURES TO DEVELOP INSIGHTS AND SOCIAL ATTITUDES

A. A Film Lesson with the Sound Film, *Navajo Children*, in a Primary Class

B. A Film Lesson in the Social Studies with an Eighth-Grade Class

A. A FILM LESSON WITH THE SOUND FILM *NAVAJO CHILDREN*

I. Introduction. One of the third-grade units of the social studies curriculum is Indians. The central theme in this study deals with Indian culture as evidenced by: (1) tools, (2) homes, (3) way of making a living, (4) social development, and (5) artistic attainment. A second purpose of this unit is to bring about a better understanding of American Indians and an appreciation of them as personalities like ourselves. Too much of our American history and too much of fiction have woven the veil of savagery and brutality about these people.

The purpose in using this film—*Navajo Children*—is (1) to give the children a realistic contact with an Indian family in which there are children, (2) to show how this family lives, and (3) to present a seminomadic people owning flocks to supply many of the material needs of the family and adding to its higher needs by the handicraft of rug weaving to furnish articles for sale at the trading post.

II. Preparation. It is understood that the film might be shown at the beginning of the Unit to arouse interest and enthusiasm and to furnish an overview of the content of the Unit on Indians. It might be shown after the class has begun the study of Indians, in which case the film should motivate, furnish information, and develop attitudes. The film might also be shown at the conclusion of the Unit. In this case it would be supposed to summarize and pave the way for a few clinching generalizations. Of course, the film might be used several times, each time with a different purpose in mind.

Some preparatory activities:

1. Reading stories in readers
2. Studying or discussing Indian rugs or pottery which may have been brought to school by the pupils
3. Organizing an activity unit on Indians
4. Place geography—western United States: distance, climate, topography, people, crops, livestock, etc.

III. Showing the film.

NAVAJO CHILDREN

PURPOSE

1.
2.
3.
4.

Teacher and pupils determine what to look for in the film. Write these goals on the blackboard.

WHAT DOES THIS FILM DO?

How well does it assist the teacher in achieving accepted educational aims?	Were possible misconceptions regarding Indians isolated and corrected? Indians: Dress grotesquely Are lazy Live in tents Hunt and fish for a living Do not have a family life comparable to that of other people	Does it stimulate A. Reflective thinking B. Creative activity C. Further study D. Immediate follow-up

A. Reflective Thinking.

1. Should you like to know these children of another race? Are they happy and friendly? Are they lazy? What do you think you would do if you lived where they live? Should you like to visit these children?
2. If you don't know much about people, can you like them as well as if

you know a great deal? How does the Indian father feel toward his children? How do the children feel toward their pets? How do you know? (Generalize—Indians love, are happy or sad, just as we are)
3. Who helps in the work? Moving? Sheep shearing? Planting? Weaving? (Division of labor, co-operation, sharing)
4. Do Navajos have any close neighbors? (Isolation)
Are they friendly? How do you know? (Social qualities)
5. How did Dark Eyes and Little Bow take care of their pets? (Care of animals)
6. Did you hear the Navajos talk? Could you understand them? (Languages)
7. What did the sheep eat? How do animals in our state get their living? (Geography—land, climate, few people and much open country)
8. Did you notice many things in the picture that were made by white men? (Shoes, overalls, wagon, coffee pot, frying pan, hoe, plough, etc.) Where do they get these? Did you notice many things made by the Indians themselves? (Bow, arrows, rug. Bring out interdependence)

B. Creative Activity. Weaving a rug, making a bow, making pottery, writing an Indian story or poem, making Indian dolls, painting Indian pictures, telling about the picture, telling about a Western trip and Indians, writing or playing Indian music.

C. Further Study.
1. Read stories—*Dancing Cloud, Chi-Wee* and *Loke, Tangled Waters.*
2. Learn about other Indian tribes.
3. Desert roads.
4. Difference between summer and winter homes.
5. What does Little Bow do during the winter?
6. What kept the horse from running away when Little Bow got off his back?
7. What is a reservation? Why do Indians live on reservations?
8. Find the names of Indian boys and girls or men and women mentioned in stories, poems, or history. What do you notice about these names? How do people get names? Have they any meaning?

D. Immediate Follow-up.
1. Discussion.
2. Plans involving thinking, activity, study.
3. Test [Specimen questions only]
   a. What was the name of the Indian boy? ________________
   b. What was his sister's name? ________________

* * *

c. The Indians shown in this picture were planting: wheat, corn, cotton, rice.

d. The wool sheared from the sheep is used for: knitting, making clothes, rug weaving, selling at the store.

* * *

e. This Indian family seems happy.	Yes	No
f. I should like to have these boys and girls for playmates.	Yes	No
g. Do Indians have their own property?	Yes	No

Fill in these blocks

	THINGS MADE BY HAND	CROPS	LIVESTOCK	CLIMATE AND LAND
Navajo				
Ourselves				

E. References.

1. For teacher
2. For pupils

B. A FILM LESSON IN THE SOCIAL STUDIES WITH AN EIGHTH–GRADE CLASS

A similar use of films in teaching the social studies on a higher grade level is presented by Kenneth J. Rehage, "Motion Pictures in Use," in *Audio-Visual Materials and Methods in the Social Studies,* William H. Hartley, editor, Eighteenth Yearbook of the National Council for the Social Studies, National Education Association, Washington, D. C., 1947.

Teachers and students should consult this specimen lesson. It explains how a unit on the essential characteristics of democracy was initiated, how films were introduced, how the films were presented and the discussion which led to a second showing, and the student activities which grew out of the lessons.

APPENDIX C FILM EVALUATION FORMS

EFLA EVALUATION

Film Title: Length: Reel(s)______ Min.______

Subject-Matter Field: Date Produced______

Producer:
Purchase Sources:

So.____ Si.____ B & W______ Color______ Sale Price______ Rental______ Free______

Evaluation Institution:

Names and Titles of Evaluators:

Synopsis:

I. Write below the major purposes for which this film could be used. Rate probable value for each purpose.

	LOW				HIGH
1.	1	2	3	4	5
2.	1	2	3	4	5
3.	1	2	3	4	5

II. Recommended level for above purposes: primary______, elementary______, junior high______, senior high______, college______, adult______.

III. Sound: Poor______Fair______Good______Excellent______

Photography: Poor______Fair______Good______Excellent______

IV. Note special strengths or weaknesses:

V. Your general estimate of the value of the film: Poor______Fair______Good______ Excellent______.

EDUCATIONAL FILM LIBRARY ASSOCIATION, INC.,
45 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

FILM EVALUATION RECORD

(*James S. Kinder*)

Title ______________________________ Producer ______________

Distributor ______________________________ Address ______________

Running Time ______ min. Sound or Silent ______ Color or Black & White ______

Cost: (sale): ______________ Lease ______________ Other data ______________

TEACHING FILM	Sup.		Exc.		Good		Fair		Poor		Scores
	10	9	8	7	6	5	4	3	2	1	
1. *Theme:* pertinency for school use, coherent, correlates with school teaching units 2. *Learning Qualities:* accuracy, authenticity, relevancy, economical of time and energy in learning 3. *Interest:* natural, keen, high 4. *Photography:* artistic, good composition, good definition (focus) 5. *Sound:* pleasing, clear, understandable all the way through											

Average score ________ Total score ________

ENTERTAINMENT FILM											
1. *Quality:* enjoyable, free from objectionable features 2. *Originality or Novelty:* new, fresh, clever 3. *Photography:* new, fresh, clever 4. *Sound:* new, fresh, clever											

Average score ________ Total score ________

Grades: El______ JHS______ SHS______ Col______ Tech______ Adult______ All______

Subjects: ______________________________

Synopsis: ______________________________

____

List objections if any ______________________________

Signed ______________________________ Date ______________

FILM RATING FORMS[1]

TEACHER PREVIEW JUDGMENT

Title of film ______________________Silent? ________Sound? ________

Source of film ______________________Name of teacher ________

School ______________________Date ________

I. What educational purposes can this motion picture assist the teacher to achieve?	Rating	Grade	Course	Unit
1.				
2.				
3.				
4.				

II. What are the *strong points* of this motion picture?

III. What are the *weak points* of this motion picture?

IV. What *changes* in the motion picture do you suggest?

V. Is this film one which predominately

________Raises questions

________Answers questions

________Does both about equally

________Does neither?

Comments: ________________

VI. What is your judgment of the film as a whole?

________Excellent

________Good

________Fair

________Poor

________Useless

VII. From the standpoint of classroom procedure where would you use this picture in a unit?

________To introduce

________To present material during unit

________To summarize

Comments: ________________

[1]The three rating forms on pages 585–6 are from Hoban, *Focus on Learning*, pp. 170–171, American Council on Education.

VIII. How much, if any, preparation will be needed

1. On the teacher's part? 2. On the student's part?

IX. Photography rating

1 2 3 4 5

X. Sound or title rating

1 2 3 4 5

TEACHER JUDGMENT OF USEFULNESS OF EDUCATIONAL MOTION PICTURES

Title of film ____________________ Silent? ________ Sound? ________

Source of film ____________________ Grade in which used ________

Subject ____________________ Unit ________

Name of teacher ____________________ School ________ Date ________

I. What *educational purposes* did you expect to achieve in using this motion picture?

II. What were the *strong points* of this motion picture?

III. What were the *weak points* of this motion picture?

IV. From the standpoint of *classroom procedure,* where did you use this motion picture?

________ 1. To introduce ________ 3. To summarize

________ 2. To present material during a unit

V. What, if anything, was done in preparation for using this motion picture?

1. By the teacher? 2. By the students?

VI. What did the students *do* which indicated that your purposes were or were not fulfilled?

VII. In terms of what you were trying to achieve, what is your *general judgment* of this motion picture?

________ 1. Excellent ________ 4. Poor

________ 2. Good ________ 5. Useless

________ 3. Fair

STUDENT JUDGMENT OF EDUCATIONAL MOTION PICTURES

Name of student ____________________ Boy? ________ Girl? ________

Title of film ____________________ Silent? ________ Sound? ________

School ____________________ Grade ________ Course ________

Name of teacher ____________________ Date ________

I. What did you *learn* from this motion picture?

II. What were the *strong points* of this motion picture?

III. What were the *weak points* of this motion picture?

IV. What incidents, parts, or features of the picture did you *like* best?

V. What is your *general judgment* of this motion picture?

________ 1. Excellent ________ 4. Poor

________ 2. Good ________ 5. Useless

________ 3. Fair

AUDIO-VISUAL EDUCATION SECTION

PLEASE DO NOT PRESENT THIS FILM TO THE CLASS BEFORE PREVIEWING

Title of film: ____________________

Sound ____________________ Length ____________________

Analysis of film:

Subject Content	Excellent ( )	Good ( )	Fair ( )	Poor ( )
Photographic Quality	Excellent ( )	Good ( )	Fair ( )	Poor ( )
Commentary	Excellent ( )	Good ( )	Fair ( )	Poor ( )

Cuts recommended *if any:* (i.e., too much advertising or scenes that might prove embarrassing.)

Suggested grade placement:

ELEMENTARY (Please circle grades for which this material is best suited.)
Kindergarten 1 2 3 4 5 6

SECONDARY

Subject (i.e., Social Living, Science, etc.) Grade Level

________	________	________	________
________	________	________	________
________	________	________	________

Films previewed by class Yes ( ) No ( )

Do you recommend that this film be added to the library? Yes ( ) No ( )

Will you please write in space below a brief summary of the highlights of this film? (Approximately 80 words or 7 lines.)

Please answer as many of these questions as possible:

1. What is this FILM *about?*

2. What *idea* or *ideas* are developed?

3. Who are the *main characters?*

4. What are the *outstanding events?*

5. What are the *setting* and *time* of the *events?*

Evaluated by: ______________________ School or section: ______________

______________________ ______________

Grade and/or subject taught:

ELEMENTARY: Grade______________

____

SECONDARY: Subject______________________ Grade Level______________

______________________ ______________

______________________ ______________

On behalf of teachers and students of Los Angeles, as well as of other cities with whom we pool evaluation and experiences, AVES thanks you.

APPENDIX D FORM FOR A NON–THEATRICAL LICENSE USED IN PENNSYLVANIA

Form LIBI-124—2M—5-46

Commonwealth of Pennsylvania
Department of Labor and Industry
Bureau of Inspection
Harrisburg

APPLICATION FOR REGISTRATION TO PROJECT NON-THEATRICAL MOTION PICTURES

NO FEE REQUIRED. MAIL APPLICATION TO THE BUREAU OF INSPECTION, DEPARTMENT OF LABOR AND INDUSTRY, HARRISBURG.

Projectionist: Read these directions carefully.

No registration card shall be issued to any person under sixteen (16) years of age. Registration cards are issued without examination and without fee to operate approved 8 mm. and 16 mm. projectors without sound equipment for public exhibitions, or with 16 mm. sound equipment for classroom instruction purposes only.

1. Name of applicant (Print your name) ____________________
2. Permanent address ____________________
   Street ______ Town ______ County ______
3. Age ______ Month and year of birth ______
4. Name of projector you operate ______ What type? ______ Width of film ______
5. Wattage of lamp ______ Does projector have sound equipment? ______
6. Will projector be used for public exhibitions? ______ For classroom instructions? ______
7. Have you previously held a registration card? ______
8. If so give year and number ______
9. TO BE FILLED IN BY SCHOOL STUDENTS ONLY.

   Name of college or school you attend ______

   Address ______ Town ______
10. TO BE FILLED IN BY APPLICANTS PERMANENTLY LOCATED.

    Name of building ______

    Location ______

    Is a permit posted authorizing the exhibition of motion pictures? ______

    Does the building have an emergency lighting system? ______ Does it operate satisfactorily? ______

    Make of emergency lighting system installed? ______
11. TO BE FILLED IN BY TRAVELLING PROJECTIONISTS ONLY

    Name, address, and business of firm employing you ______

    ____

Signature of applicant ____________________

All of the above questions that apply to your particular status must be answered in full or application will be returned.

A list of approved 8 mm. and 16 mm. projectors may be obtained from the Department upon request. A permit must be secured from the Department and posted in every building in which motion pictures are exhibited, except for classroom instructions.

APPENDIX E FORMS FOR APPRAISAL AND EVALUATION OF RECORDINGS AND TRANSCRIPTIONS

APPRAISAL OF AN EDUCATIONAL RECORDING

Teacher's Name ____________________School __________City ______________State _______

Number of Listeners __________Subject(s) __________Grade(s) __________ Date__________

Title of Recording __________ ____________________Title of Series __________________

EDUCATIONAL VALUE

1. How well did this program satisfy each criterion listed below? Indicate your rating of the program by encircling a letter before each question as follows:

a = excellent   c = fair
b = good   d = poor
x = criterion does not apply

a b c d x Was the content of the program significant?
a b c d x Was the content of the program accurate?
a b c d x Was the content related to students' interests and needs?
a b c d x Did the program show the social or cultural value of the content?
a b c d x Did the program develop valid generalizations?
a b c d x Did the program provide experience otherwise unavailable in the classroom?
a b c d x Did the program integrate materials from different subject-matter fields?

(If necessary, add other criteria and rate them in the same way.)

a b c d x ____

a b c d x ____

2. What educational features of the program were of outstanding value?

____

____ ☐ None

3. What educational features of the program were of doubtful value?

____

____ ☐ None

4. What is your rating of the general educational value of this program?

________excellent ________good ________fair ________poor

CLARITY AND COMPREHENSIBILITY

5. To what extent did this program satisfy the following criteria for *most* of your students? Indicate your rating of the program by encircling a letter before each question as follows:

a = all of the time c = some of the time
b = most of the time d = none of the time
x = criterion does not apply

a b c d x Was the program heard clearly by the students?
a b c d x Was the program free from distracting needle scratch or other defects?
a b c d x Was the organization or pattern of the program clear to students?
a b c d x Was the pace or rate of movement of the program suitable?
a b c d x Were transitions clear? Could students identify time, place, and character?
a b c d x Were the sound effects appropriate?
a b c d x Were the vocabulary and dialogue understandable?
a b c d x Was the music appropriate?
a b c d x Was the general maturity level suitable for your students?

6. What production features contributed most to clarity and comprehensibility?

____

____ ☐ None

7. What production features detracted most from clarity and comprehensibility?

____

____ ☐ None

8. In general, was the program clearly comprehensible to most of your students?

_____all of the time _____most of the time _____some of the time
_____none of the time

APPEAL TO STUDENTS

9. How many of the students in your class indicated that they really enjoyed this program?

_____all _____many _____few _____none

10. What features of the program were highly interesting to most of the students?

____

____ ☐ None

11. What features of the program were uninteresting to most of the students?

____

____ ☐ None

UTILIZATION

12. Describe briefly your preparation for the program.

____

____ ☐ None

13. What student activities resulted from hearing this program? (Discussion, reading, writing, trips, etc.)

____

______________________________ ☐ None

14. Did you play any part of the program a second time? Which parts and why?

____

______________________________ ☐ None

15. For what subjects (courses) would this recording be valuable? When possible, specify units in each course.

____

______________________________ ☐ None

16. Please quote typical student comments about the content or production or appeal of the program.

____

______________________________ ☐ None

(*Evaluation of School Broadcasts, Ohio State University, Columbus, Ohio*)

REPORT ON RADIO TRANSCRIPTION

Name ______________ School ______________

City ______________ County ______________ State ______________

Subjects for Which Transcription Might Be Used ______________ Suggested Grade ______________

General Title of This Program Series ______________

Title of This Broadcast ______________ Length of Program ______________

Directions: Recordings or transcriptions of radio programs in special subject-matter fields are being increasingly made available for school use. In order that a solid body of reliable information about their usefulness can be built up, it is very important that you appraise or evaluate this particular transcription with utter frankness. Please check those items which most nearly express your judgment of the educational value of this program to your class.

1. Was the transcription clear and distinct
______(a) all of the time?
______(b) part of the time?
______(c) most of the time?

2. For classroom use, would you rate this transcription as being
______(a) very valuable?
______(b) suitable?
______(c) entirely unsuitable?

3. For your purpose, was this transcription
______(a) too long?
______(b) too short?
______(c) about right?

4. For use at your grade level, was this transcription
______(a) appropriate?
______(b) usable?
______(c) unsuitable?

5. Was the main theme of the transcription
______(a) well brought out?
______(b) poorly brought out?
______(c) no main theme apparent?

6. Were the points that were emphasized in the transcription
______(a) too many?
______(b) too few?
______(c) about right?

7. The vocabulary in the transcription would be satisfactory at
______(a) the elementary level
______(b) the intermediate level
______(c) the junior high level
______(d) the senior high level

8. Was the action in the transcription
______(a) too rapid?
______(b) about right?
______(c) too slow?
______(d) not enough action?

9. Was the amount of dramatization
______(a) about right?
______(b) too much?
______(c) too little?

10. Did you always know which character or person in the program was speaking?
______(a) Yes.
______(b) No.

11. Did the music in the transcription
______(a) contribute to the enjoyment of the program?
______(b) detract from the program?
______(c) the music neither added nor detracted
______(d) no music in the program

12. Were the transitions between scenes
______(a) confusing?
______(b) clear?

13. Did the sound effects used seem
______(a) effective?
______(b) ineffective?

14. Would you say that the general appeal of the program for the majority of students at the suggested grade levels was
______(a) high?
______(b) average?
______(c) low?

(Ohio State University Radio Evaluation Project)

TRANSCRIPTION RATING

Title: ______________________________
Series: ______________________________
Source: ______________________________
Cost:______________ Playing Time:__________
Rating:
Excellent ( ) Good ( ) Fair ( ) Poor ( )
Recommended for purchase: Yes ( ) No ( )
Grade Placement:______________ Also suitable for
High-School Grades__________ Elem. Grades________
Subjects: ______________________________
Number of teachers evaluating this record__________
Signed ______________________ Grade ________
School or Section: ______________________
Date______________________

(OVER)

(Reverse side—"Remarks" and "Student Reaction")

The above "Transcription Rating" form is reproduced here through the courtesy of the Audio-Visual Aids Division of the Los Angeles Public Schools.

AUDIO-VISUAL EDUCATION SECTION

EVALUATION SHEET

TO:

The Audio-Visual Education Section (AVES) needs your help and advice in previewing and evaluating the voluminous amount of Audio-Visual materials offered for acquisition.

We audio-visualites know that only through teacher participation and opinion can sound judgment be passed upon materials. There are too few of us in this department to preview and evaluate all the materials which come to us.

WARNING . . . .

We have not seen or heard the materials on which your opinion is requested. To save possible embarrassment, it is suggested that these materials should *not* be presented to a class until *after* previewing. However, it is urged that after previewing *acceptable* material, you present it to one or more classes for student reaction.

Your contribution will be invaluable and your decision will be of utmost importance in helping to determine whether or not the department will acquire the materials under consideration.

[*The above introduction to the "Evaluation Form" which follows below is reproduced here through the courtesy of the Los Angeles Public Schools. The paragraph following the word "Warning" is significant.*]

AUDIO-VISUAL EDUCATION SECTION

PLEASE DO NOT PRESENT THIS TRANSCRIPTION TO THE CLASS BEFORE PREVIEWING

TITLE OF TRANSCRIPTION: ____________________

SERIES ____________________

START __________ RPM __________ PLAYING TIME __________

ANALYSIS OF TRANSCRIPTION:

Subject Content	Excellent ( )	Good ( )	Fair ( )	Poor ( )
Length of Transcription	Excellent ( )	Good ( )	Fair ( )	Poor ( )
Clearness of Commentation	Excellent ( )	Good ( )	Fair ( )	Poor ( )
The Commentation is	Acceptable ( )	Objectionable ( )		
Does the Transcription contain advertising		Yes ( )	No ( )	
Is the advertising objectionable		Yes ( )	No ( )	

SUGGESTED GRADE PLACEMENT:

ELEMENTARY (Please circle grades for which this material is best suited.)

Kindergarten 1 2 3 4 5 6

SECONDARY

SUBJECT (i.e., Social Living, Science, etc.) GRADE LEVEL

________	________	________	________
________	________	________	________
________	________	________	________

TRANSCRIPTION AUDITIONED BY CLASS YES ( ) No ( )

DO YOU RECOMMEND THAT THIS TRANSCRIPTION BE ADDED TO THE LIBRARY? YES ( ) No ( )

WILL YOU PLEASE WRITE IN SPACE BELOW A BRIEF SUMMARY OF THE HIGHLIGHTS OF THIS TRANSCRIPTION? (Approximately 80 words or 7 lines.)

PLEASE ANSWER AS MANY OF THESE QUESTIONS AS POSSIBLE:

1. What is this TRANSCRIPTION *about?*

2. What *idea* or *ideas* are developed?

3. Who are the *main characters?*

4. What are the *outstanding events?*

5. What are the *setting* and *time* of the *events*?

EVALUATED BY: ________________ SCHOOL OR SECTION: ________________

________________________________ ________________________________

GRADE and/or SUBJECT TAUGHT:

ELEMENTARY: Grade ________________

____

SECONDARY: Subject ________________ Grade Level ________________

________________ ________________

________________ ________________

On behalf of teachers and students of Los Angeles, as well as of other cities with whom we pool evaluation and experiences, AVES thanks you.

APPENDIX F FORMS FOR EXPEDITING THE AUDIO-VISUAL PROGRAM

PLEASE COMPLETE THIS FORM ON THE TYPEWRITER

ELEMENTARY

MOTION PICTURE ORDER BLANK

AUDIO-VISUAL AIDS SECTION

School____________________Audio-Visual Aids Representative ____________________
(All Elementary teachers' orders appear on this form)

REMARKS:

INSTRUCTIONS:

Films remain in school for one week unless otherwise designated.
Please examine label on each bag of films delivered to school for time and method of return.
Please order for <u>ten weeks in advance,</u> as listed below.

Orders for films to be used during the________period________________inclusive, will be accepted from ____________________inclusive.

Requests are booked in the order in which they are received.

PLEASE LIST FILMS ON BACK OF THIS SHEET
(over)

Form NS 5A

PITTSBURGH
PUBLIC
SCHOOLS

RECEIPT

150 Pads 3-36*3

DEPARTMENT OF SCIENCE
NATURE STUDY AND
VISUALIZATION

Requisition for Visual Aids

Returned to the school for posting on the school bulletin board.
After all items have been received this sheet shall be returned to the
Department of Visualization.

School No.................................

....19

ALL MATERIALS CHECKED WERE RECEIVED AT...................................SCHOOL

CATALOGUE NUMBERS DOUBLE SPACE	CHECK	GRADE	DATE DESIRED	DATE RESERVED	THIS SPACE MUST BE LEFT FOR THE PACKER'S USE
					NOTE: This Requisition Form is arranged in quadruplicate. The four sheets are in different colors and are headed, "Department Copy," "Principal's Copy," "Packers' Copy," and "Receipt."

Material marked O is temporarily out of stock.
If reservation is desired, material must be re-requisitioned.

Material received by

....
Principal or teacher in charge of material.

The forms which follow are reproduced through the courtesy of the Aids Division of the Los Angeles Public Schools.

RENEWAL SLIP

School ______________________

Teacher ______________________

Material is due ______________________

Renew to ______________________

OVERDUE TRANSCRIPTION NOTICE

Our records indicate you are still charged with the following transcriptions which were due ______________

Will you please put them in the proper place for pickup by the Sentous St. Center Truck on ____________

Please disregard this notice if the transcriptions have been returned or renewed.

If an error has been made, please call Mrs. L. E. Reno. RI. 5546 Ext. 25

AUDIO-VISUAL AIDS SECTION

Our records indicate you are still charged with the following materials which were due ______________

Kindly communicate with us at once. Refer to Mrs. L. E. Reno. Phone Ri. 5546 Extension 25

Notice

AUDIO-VISUAL EDUCATION SECTION
1205 W. Pico - Sentous St. Center

FILMS REQUESTED FOR APPROVAL

Title:

Source:

16mm Silent ( ) 16mm Sound ( ) Reels______

Date Rec'd: Inspected By:

How Rec'd: Cost:

DUE DATE: Approved:

Date Returned:

SOUND FILM STRIPS REQUESTED FOR APPROVAL

Title:

Source:

Transcription________ Filmstrips________

Date Rec'd:

DUE DATE: Cost:

Date Returned Approved.

TRANSCRIPTIONS REQUESTED FOR APPROVAL

Title

Series
Source
Playing time Cost

Requested by
Date ordered:

Date received: Approved____________
How received Yes or No

Date returned:
By mail ( ) express ( ) school messenger ( )____________

FILM RECEIPT CARD

Title:

Source:
Address:

Cat. # Dup. of:

Date rec'd: Silent( ) Reels________
How rec'd: Sound ( ) Cost ________

Accessioned________________ Date____________(Editor)
Cataloged ________________ Date____________(Cataloger)
Prepared for circ.__________ Date____________(Shipper)
Ready for booking__________ Date____________(Booker)

SOUND FILM STRIP RECEIPT CARD

Title: Date Rec'd:
Cat. # Cost:
Dup. of:
Source:
Address:

Playing Time: Transcriptions________
Reverse Side: Filmstrips ________

Accessioned______________________Date__________ (Editor)
Cataloged________________________Date__________ (Cataloger)
Prepared for circ.______________Date__________ (Shipper)
Ready for booking _____________Date__________ (Booker)

TRANSCRIPTIONS FOR CIRCULATION

Title:
Cat. # Date Rec'd
Dup. of: Cost:
Series:
Source:

Start inside ( ) Start outside ( ) RPM 33⅓ ( ) 78 ( )
Reverse side:
Accessioned by: ____________________
Digest written by: ____________________
Cataloged by: ____________________Cataloger
Prepared for circulation by ____________________Shipper
Ready for booking: ____________________Booker

Form 35.3—20M—7-42

REQUEST CARD
VISUAL EDUCATION SECTION

Special Request for:
Slides
Stillfilms
Stereographs

School Date

Teacher

Titles:

Unit of Study:
Date Wanted:
Cannot use after.................................. (Over)

Name________________________________ Grade_______

School____________________________________

Subjects Taught:

I am willing to help in the evaluation of one or more types of the following audio-visual materials:

Motion Pictures __________
Filmstrips __________
Slides __________
Sound Slides __________
Transcriptions __________
Exhibits __________
Wall Charts __________
Portfolios __________
Study Prints __________

FILM RATING

Title: ____________________________________

Source: ____________________________________
Sound ( ) Silent ( ) Length________ Price________
Rating:
Excellent ( ) Good ( ) Fair ( ) Poor ( )
Recommended for purchase: Yes ( ) No ( )
Grade Placement: Subjects:
Elementary________ ________________
Secondary ________ ________________
____
Signed: ____________________ Grade:________

School or Section: ________________________
Date__________ (over)

Lib. No.	Date Due:	Renewed to:
School		
Teacher		
Charts:		
Lantern Slides:		
Study Prints:		

Form 85.1a—20M—9-43 1st NOTICE.................. 2nd NOTICE.................. (Over)

(Reverse side - Stereographs, Stillfilm rolls, Exhibits, and Portfolios)

VISUAL EDUCATION SECTION
1205 WEST PICO STREET

Upon receipt of the Visual Education material used by you, we find the following condition:

____

____

____

Your cooperation in helping us keep our sets intact is greatly appreciated. If there is an apparent error, please communicate with us. Phone Ri. 5546 Extension 25

First Notice________ Mrs.) L. E. Reno
ISUAL EDUCATION SECTION

This is the last delivery on your present order.

Kindly submit a new order for future deliveries.

Thank you.

Clerk in charge of ____________
AUDIO-VISUAL AIDS SECTION

We are now accepting orders for next semester.

APPENDIX G A SPECIMEN RADIO SCRIPT

KDKA SCHOOL OF THE AIR

THERE'S FUN AFIELD

25

TREE SQUIRRELS

DATE: Thursday, March 6, 1947 CONTINUITY: Vickey Corey

TIME: 9:45–10:00 A.M. PRODUCTION: Lionel Poulton

MUSIC:———(THEME. MIDSUMMER NIGHT'S DREAM. SCHERZO. 504–4)

ANNCR: THE KDKA SCHOOL OF THE AIR

MUSIC:———(UP AND UNDER)

ANNCR: There's Fun Afield . . . whether you're in the great wide woods or in your own backyard . . . if . . . you just have eyes to see! And when you're on the alert—looking for something new . . . who knows what exciting adventures may come about on even the most casual morning!

RED: (CALLING OFF MIKE. COMING ON) Joan! Oh, Joan! Aren't you coming out? What's keeping you?

JOAN: Ssh! Red! Be quiet!

RED: What are you doing . . . just standing on the porch there?

JOAN: (VOICE HUSHED) Look . . . the squirrel. . . . Isn't he the loveliest furry thing you ever saw?

RED: Where?

JOAN: On the porch railing. See him? Don't move, Red.

RED: Say, look at that big, bushy tail! He's a red squirrel! Give him a walnut, Joan. See if he'll take it.

JOAN: I have one here. I think he's coming. . . .

RED: (HIS VOICE LOWERS IN EXCITEMENT) Hold it down lower. . . .

JOAN: He sees it. He's coming. . . .

RED: Watch his teeth if he tries to take it from you. Squirrels have teeth that can give you an awful bite!

JOAN: (VOICE LOWERS AS SQUIRREL APPROACHES) Oh, do you think . . . he's coming right up to me! Red, I think he's going to take it . . . (LITTLE SCREAM) Ooooooh!

RED: (VOICE LOWERS IN DISGUST) You scared him! What made you jump that way?

JOAN: His teeth . . . I was afraid he'd bite me!

RED: He probably was afraid you'd bite *him!* Come on, let's go after him and see if we can find where he lives.

JOAN: I know he has a house somewhere . . . come on, Red!

RED: (BREATHLESS) I see him whisking right through the woods ahead!

JOAN: (BREATHLESS) Watch him, Red! See where he's going!

RED: Up the oak tree. Hurry up, Joan! We don't want to miss him!

JOAN: It's the next tree . . . not this one.

RED: I don't see him. . . . Let's try this one—over here.

JOAN: I see something! . . . Red!

SOUND:——(CHATTERING SCOLDING OF RED SQUIRREL)

RED: Listen! What's that?

SOUND:——(UP)

JOAN: It's . . . it must be a squirrel! The squirrel we were chasing!

RED: There he is . . . out on the limb of the tree . . . just above us.

JOAN: How angry he is—leaping up and down—chattering!

RED: Isn't he a spunky little fellow! (LAUGH) Listen to him scolding us!

JOAN: But what's he so angry about? I wish I could know what he's saying.

RED: You wouldn't want to! Not when he sounds like that! Where do you suppose he lives?

SOUND:——(TINKLING CHIME OF ERGO'S APPROACH)

RED: It's Ergo coming! I hear him.

JOAN: Ergo, he can help us! He must know the squirrel!

ERGO: (COMING ON. LAUGHING) Oh ho ho! Humans are the funniest beings on earth! They've lived for ages and ages, but they never seem to learn!

RED: Learn what, Ergo? I think we've learned quite a lot.

JOAN: You'd think so if you went with us to school once. We learn things every day.

ERGO: But you never spend much time learning to think!

RED: What's the matter now?

ERGO: Suppose someone wanted to make friends with you. Do you think you'd let him get very far if he screamed at you and started chasing you?

JOAN: (LAUGHS) Of course not! That's silly.

ERGO: That's just why I was laughing.

RED: What do you mean?

ERGO: You wanted to meet Sammy, didn't you?

JOAN: We do, Ergo. He was so sweet! But he's so timid. I almost had him taking a walnut from my hand.

ERGO: And then you screamed at him and started running after him.

RED: When you put it that way, it wasn't so smart, was it?

JOAN: We're sorry, Ergo. We want to know where he lives. What can we do to tell him?

ERGO: Wait a minute. I'll explain things to him.

JOAN: You'll explain. . . . ?

ERGO: Just a minute, please.

SOUND:——(CHATTERING SOUNDS ON MIKE . . . ERGO IS TALKING TO SQUIRREL)

RED: Can you beat that! Listen! Ergo sounds just like a squirrel, himself.

SOUND:——(CHATTERING ANSWER. OFF MIKE)

JOAN: And the squirrel's answering him, just as if he understood everything Ergo said.

ERGO: And why shouldn't he understand? He says it's hard to believe that you're peaceable humans . . . with all the wild running and shouting, but he's willing to take my word for it and come down and meet you. . . .

RED: He is?

ERGO: But no rushing and leaping at him.

JOAN: We wouldn't! We wouldn't for the world.

SQUIRREL: (COMING ON) Well just don't forget you *did*. You know you did. You can't deny it.

JOAN: He . . . he's talking . . . we can understand what he says.

SQUIRREL: Ho! That! That's Ergo! He's full of tricks like that. I don't mind talking to you though. Just so it doesn't get to be a habit . . . you mustn't expect it every day.

RED: We . . . we won't. This is funny.

SQUIRREL: They're not very interesting, are they, Ergo? They just stand around and stare and say silly things.

RED: (INDIGNANTLY) We do not! We're just surprised, that's all. We've been wanting to know you for a long time . . . ever since you moved into the neighborhood.

SQUIRREL: Queer way you have of showing it. The very first thing you did was to take my supply of chestnut burrs . . . unopened chestnut burrs . . . that I had spent a whole morning cutting.

JOAN: Chestnut burrs. . . .

RED: Oh! I remember! You were with me, Joan. Don't you remember one day last fall . . . we found that great heap of chestnuts on the ground. . . .

JOAN: Oh, yes! We wondered how they had gotten there. We . . . we took them home.

SQUIRREL: They were mine! I clipped each one from the tree so that I'd be sure of them before they opened. I was going to take them to my store room and have them this winter.

JOAN: I'm so sorry! We didn't know they belonged to anybody.

RED: That's too bad. We wouldn't have done it if we had known. Er . . . just what are you eating this winter in place of them?

SQUIRREL: It was a problem, I can tell you. If it hadn't been for an especially fine mushroom yield, I'd have been in a bad fix.

JOAN: Mushroom yield! What do mushrooms have to do with it?

SQUIRREL: Why do they ask such questions, Ergo? I've noticed you humans eat mushrooms. I have trouble enough getting to the mushrooms growing in the woods before you get them.

RED: We don't pick mushrooms, Joan and I. We don't know the good ones from the poisonous ones. We'd never think of picking them.

JOAN: Do you mean you eat mushrooms, too?

SQUIRREL: It's a little early in the season to show you my fine mushroom drying equipment.

ERGO: (CHUCKLE) What's that I see up in the top of the oak tree, Sammy? It looks like a supply you've forgotten.

SQUIRREL: Mushrooms? Well, bless my soul! So it is! Fancy my forgetting anything as important as that.

ERGO: You can't brag about your memory, my friend! You squirrels spend your entire summers gathering food supplies and you never remember where you store half of them.

SQUIRREL: How dare you charge me with such a crime? What proof have you?

ERGO: Proof! Why a good percentage of all the trees in the forest come from nuts and acorns—acorns you've gathered and forgotten to dig up in the winter.

SQUIRREL: I dare you to prove it! I dare you to prove such a dastardly, unsquirrel-like thing!

JOAN: Oh, don't quarrel, please! Are those really mushrooms up in the top of the oak tree?

RED: Don't be silly, Joan. You'd never find mushrooms at the top of an oak tree.

SQUIRREL: Why not, I'd like to know? They'd be there if I took them up there to dry them. And it just happens that's what I did. Somehow it slipped my mind in the press of other important matters.

RED: How would you get them to stay up there?

SQUIRREL: That's the main trouble with humans! No common sense at all! How would you expect to keep a mushroom on the top of a tree?

JOAN: I don't know how a *squirrel* would expect to do it.

SQUIRREL: We take the simplest, most efficient, most economical methods. Simply stick the mushroom on the tip of a twig and let it stay there . . . it dries and it's well-preserved for the winter. And besides it's too high for any other animal to get it.

JOAN: What else do you eat? We try to coax you with nuts. I didn't know there were other things you liked, too.

SQUIRREL: No imagination! Did you ever try pine cones?

RED: Pine cones? No, I never did. What would they taste like?

JOAN: Prickly, I should say.

SQUIRREL: Prickly, if you don't know any better than to eat the woody parts. But the seeds, now . . . Delicious! We cut them down early . . . while they're green so that the seeds stay in the cones until we're ready for them. It's much easier. Then there's corn, wheat . . . apples are good, too.

JOAN: It must be quite a job for a squirrel to carry away apples.

SQUIRREL: Nuts are easier. We have pockets in our cheeks expecially designed for carrying nuts.

RED: We like apples in the wintertime, too. They're fun to eat at night before a big roaring fire.

SQUIRREL: Uh uhm! Aren't the seeds wonderful?

JOAN: The seeds? Well, I don't know. We don't eat *them*.

SQUIRREL: You don't eat them? What do you do with them? Throw them away? The very nicest part of the apple?

RED: I suppose it all depends on the point of view.

SQUIRREL: That's what I always say. Like the matter of houses. Why do humans live the way they do?

JOAN: How do you live? We've been looking for your house.

SQUIRREL: Me? Oh, it all depends on the time of the year you've looked for it.

ERGO: Squirrels have summer homes and winter homes . . . if they're lucky enough to be able to find them.

SQUIRREL: That's reasonable! I've heard even some humans do that sometimes. In the spring we choose a high branch of a leafy tree. Then we build a nest on it.

RED: A nest like the birds make?

SQUIRREL: Of course not! Birds go about it the wrong way . . . they start it all backwards. Imagine, if you can, such nonsense as beginning to build the outside of your nest first.

JOAN: The outside first? How else would you do it?

SQUIRREL: Ergo, you didn't tell me they were so addled!

ERGO: It's all right. They're just used to other ways of doing things. Go ahead . . . tell them.

SQUIRREL: Well, if you really want to know the proper way to build a nest . . . you set yourself right in the middle of the place where you want your nest to be and you start working with teeth and claws . . . mind you . . . no half way stuff about it!

RED: And how do you do it then?

SQUIRREL: You build a hollow frame of twigs and pack it around with shredded bark, moss, grass stems, then you bring down a leafy branch or so to curl around the outside and you're all through. That makes a good shelter from the wind and rain. I always like to have a lining of pine needles and feathers inside for extra warmth and softness.

JOAN: Feathers? Where would you get feathers?

SQUIRREL: Oh, I manage to collect a few when I'm hunting for birds' eggs breakfast.

RED: Birds' eggs! You don't eat them, do you?

JOAN: Those lovely little eggs the birds lay?

SQUIRREL: They are wonderful, aren't they? (MAKES SMACKING SOUND WITH MOUTH)

JOAN: I think that's perfectly terrible!

SQUIRREL: You do? You should see the birds' eggs my cousins, the gray squirrels and the fox squirrels eat!

RED: We used to have gray squirrels here before you red squirrels came. What happened to them? They used to come right in the house to take food from the table.

SQUIRREL: I always thought that was their trouble . . . they became too friendly with humans. They lost all their nerve. Cowards! That's what I call them!

ERGO: Sammy's family drove the gray squirrels out when they came to the woods here.

SQUIRREL: We didn't do anything to them. We didn't have to! (LAUGHS) They ran as soon as we came.

ERGO: They know you red squirrels are better fighters than they are.

RED: What are fox squirrels? I never saw them.

ERGO: They're the biggest of all the squirrels. . . . Sometimes they weigh as much as three pounds.

JOAN: That's a very big squirrel. Why don't we have them here, Ergo?

ERGO: Because they like to live in the south. You have flying squirrels in your woods, though . . . and I'll bet you've never seen one.

RED: Flying squirrels in this woods . . . right here?

ERGO: That's what you have . . . right here. You don't see them, because they only come out at night.

JOAN: They don't really fly, do they?

ERGO: They look like they fly, but it's a glide, really. The skin on their sides is widened into a kind of a wing that reaches from their wrists back to their ankles. They leap from a high tree and glide almost like flying down to another branch.

RED: (LAUGHS) It sounds like coasting!

ERGO: It's something like that.

RED: Do they live near you, Sammy?

SQUIRREL: (SHORTLY) No.

JOAN: Look, we were talking about your spring home, Sammy. Show us where it is . . . I'd love to see you building it. . . .

RED: Yes, and why do you need such soft lining in the nest . . . pine needles and feathers?

SQUIRREL: For the babies, of course. We have to have it ready.

JOAN: Babies! How wonderful!

ERGO: They're very tiny when they're born . . . hardly bigger than half of your little finger.

RED: As tiny as that?

SQUIRREL: They're blind and hairless . . . very delicate and quite unattractive, really.

RED: Are they born yet, Sammy?

SQUIRREL: Of course not. I'm just building the nest for them. All Squirrel babies come later in the spring.

JOAN: And they'll lie up there in their nest in the tree?

SQUIRREL: For a month at least. They'll be big enough to come down and get their first lessons then. By the end of summer they'll be about half grown . . . they'll be climbing as well as I do. Then we'll have one more family in the nest before winter.

JOAN: Where do you live in the winter?

SQUIRREL: I don't mind telling you . . . I have a hole in this very tree we're standing under.

RED: I don't see anything but a hole where a flicker had her nest last summer.

SQUIRREL: Well?

JOAN: Is that where you live? In the flicker's nest?

SQUIRREL: Can you think of a better place to live?

RED: I guess not. But how do you keep warm when it's snowing and cold outside?

SQUIRREL: (LAUGHS) I've the thickest warmest blanket in the whole forest. Why shouldn't I keep warm?

JOAN: What kind of blanket is it?

SQUIRREL: You have eyes, haven't you?

JOAN: Yes . . . but I don't know what to look for.

SQUIRREL: What would you do if you had a tail as warm and bushy as mine? Wouldn't you wrap it around you and keep warm under it?

RED: So that's what you do! Not bad! Not bad!

SQUIRREL: In one way that tail of mine is the most important thing I have. Why, if I didn't have it, I wouldn't be able to leap through the air the way I do.

JOAN: I can't see what a tail has to do with jumping. I can see it would help you keep your balance when you're on a high branch.

SQUIRREL: It's good for that, too. But you see . . . in jumping it acts as a sort of parachute, like you humans use. Would you like to see?

RED: Go ahead. We'd love to see how you use it.

SQUIRREL: Stand back . . . way back there. Farther. That's not enough.

JOAN: That's funny! Why should we have to move as far back as this?

RED: It's one of his ideas. Let's humor him. (CALLS) How's this, Sammy?

SQUIRREL: (OFF MIKE A LITTLE) That'll do, I guess.

JOAN: Ergo, aren't you going to stand over here with us?

ERGO: (A LITTLE OFF MIKE TOO) (LAUGHING) No. This is something Sammy Squirrel and I are going to do together. Isn't that so, Sammy?

SQUIRREL: (LAUGHING TOO) That's right, Ergo. Watch carefully now! One . . . two . . . three . . . Come on, Ergo!

SOUND:——(TINKLING CHIME OF ERGO'S DEPARTURE)

RED: (SHOUTS) Wait! Not so fast! We can't see where you're going there!

JOAN: (SADLY) No. We can't. Don't you see, Red? They've gone. . . . Both of them. We were asking about his nest and his babies and he got nervous about them. So . . . he and Ergo have whisked right out of sight in one of the trees.

SOUND:——(OFF MIKE–SQUIRREL CHATTERS)

ERGO: (OFF MIKE. FADING) Don't let that worry you. I'll be around next week with a Salamander friend of mine, I'd like you to meet. We'll be with you.

MUSIC:——(THEME)

ANNCR: THERE'S FUN AFIELD, written by Vickey Corey and directed by Lionel Poulton, is in cooperation with the public and private schools of Pittsburgh and Allegheny County. This has been a presentation of your Westinghouse Station.

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